

Fayetteville State University
College of Basic and Applied Sciences
Department of Mathematics and Computer Science

I. Locator Information

Instructor: Dr. Yorgov

Course Number and Name: MATH361-01, Introduction to Modern Algebra I

Semester Credit Hours: 3

Day and Time Class Meets: Monday, Wednesday, Friday 3:00 -3:50 p.m.

Total Contact Hours for Class: 45

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Office Location: SBE 342

Office hours: MW 4-6 p.m., TR 9-11 p.m.

Office Phone: 672-1675

FSU Policy on Electronic Mail: Fayetteville State University provides to each student, free of charge, an electronic mail account (username@uncfsu.edu) that is easily accessible via the Internet. The university has established FSU email as the primary mode of correspondence between university officials and enrolled students. Inquiries and requests from students pertaining to academic records, grades, bills, financial aid, and other matters of a confidential nature must be submitted via FSU email. Inquiries or requests from personal email accounts are not assured a response. The university maintains open-use computer laboratories throughout the campus that can be used to access electronic mail.

Rules and regulations governing the use of FSU email may be found at <http://www.uncfsu.edu/PDFs/EmailPolicyFinal.pdf>

II. Course Description

This is the first course of a two-semester sequence introducing fundamental concepts and proof techniques used in abstract algebra and including studies of groups, normal subgroups, quotient groups, homomorphisms, rings, ideals, quotient rings, integral domains, fields, and related topics. Prerequisite:

MATH 251 and MATH 260.

III. Disabled Student Services

In accordance with Section 504 of the 1973 Rehabilitation Act and the Americans with Disabilities Act (ADA) of 1990, if you have a disability or think you have a disability to please contact the Center for Personal Development in the Spaulding Building, Room 155 (1st Floor); 910-672-1203.

IV. Textbook

Contemporary Abstract Algebra (Sixth Edition), Joseph A. Gallian, Houghton Mifflin Company, 2006.

V. Student Learning Outcomes

Upon the completion of this course, the student shall be able to:

- Give examples of groups, subgroups, external direct products, cosets, normal subgroups, and factor groups.
- Prove the basic properties of groups and find the order of an element of a group.
- Utilize the definitions of the center, generator, and commuter of a group in solving problems.
- Utilize the properties of cyclic groups, permutation groups, and state the Cayley's Theorem.
- Prove the Lagrange's Theorem and its consequences.

- State the G/Z Theorem, the First Isomorphism Theorem, and the Fundamental Theorem of Finite Abelian Groups.
- Give examples of isomorphism classes of finite Abelian groups.
- Give examples of rings, fields, and integral domains.

VI. Course Requirements and Evaluation Criteria

The emphasis in this course will be more on proofs and less on computation. Proofs could be as short as a line and as long as several pages. The “one-liners” may be ingenious and the longer ones may be straightforward. So do not judge the difficulty of the proofs by their length. Always have a paper and pencil ready as you read the text. You will often need time as you “plow through” your reading. One learns to do proofs by doing them rather than reading them. This may be a little frustrating to begin with, so do not despair!

Write your proofs with a reader in mind. The proof should not only convince you, but it must convince others. Write your proofs in complete English sentences and provide clear transitions. You are not banned from collaborating with other members of the class on homework problems but do not write down something that you do not understand!

Students are encouraged to ask questions of the instructor in class and to respond to those posed by the instructor. They should not discourage others from raising or answering questions. Often, other students have the same question which they wish to ask, but are hesitant to do so. Students are expected to do all of the assignments. Three homework assignments, three tests, and a comprehensive final exam will be administered. In arriving at an average, all tests will be weighted the same and the lowest test score will be dropped. A letter grade will be assigned as follows:

Tests Average: 50%; Homework: 20%; Final Exam: 20%; Participation: 10%
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Grading Scale:

A: 90-100	B: 80-90	C: 70-80	D: 60-70	F: below 60
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Policy on **Missed** or **Late Assignments** - Late homework will no longer be accepted after it has been graded and returned to class. If a homework is turned in the day after it is due, it will lose 15% of its total value. For two days delay it will lose 30% of its total value and so on. **No make up tests** for unexcused absences! For excused absences student should contact the instructor prior to the test.

Attendance Requirements – Students are expected to attend classes regularly. The FSU Attendance Policy stated on page 75 of the 2010-2011 University Catalogue will be strictly enforced. **Three (3) late arrivals** and/or **early departures** will count as one absence. Exceeding the limit of four (4) unexcused absences will result in a grade of **EA**.

VII. Academic Support Resources

Students are encouraged to use the Blackboard Learning System where lecture notes, solutions to problems, and other materials will be posted.

VIII. Course Outline and Assignment Schedule

Day	Topics
08.19	Chapter 0: Preliminaries Properties of Integers, Modular Arithmetic, GCD, Euclid’s Lemma, Euclidean Algorithm
08.22	Mathematical Induction, Equivalence Relations
08.24	Problems
08.26	Chapter 1: Symmetries of a Square, Dihedral Groups
08.29	Problems
08.31	Chapter 2: Definitions and Examples of Groups. Elementary Properties of Groups

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	Problems
09.02	Chapter 3: Finite Groups, Subgroups, Subgroup Tests, Examples of Subgroups
09.07	Problems
09.09	Chapter 4: Properties of Cyclic Groups, Classification of Subgroups of Cyclic Groups
09.12	Problems
09.14	Homework #1 Due. Review
09.16	Test 1
09.19	Chapter 5: Permutation Groups, Cycle Notation. Properties of Permutations
09.21	Problems
09.23	Chapter 6: Isomorphisms, Definitions and Examples, Cayley's Theorem. Properties of Isomorphisms, Automorphisms
09.26	Problems
09.28	Chapter 7: Cosets and Lagrange's Theorem Corollaries. Application of Cosets to Permutation Groups
09.30	Homework #2 Due. Problems
10.03	Chapter 8: External Direct Products - Definitions, Examples, and Properties.
10.05	The group of Units Modulo n as an External Direct Product
10.07	Problems
10.10	Review
10.12	Test 2
10.14	Chapter 9: Normal Subgroups, Factor Groups.
10.19	Applications and Internal Direct Product
10.21	Problems
10.24	Chapter 10: Group Homomorphisms – Definitions and Examples
10.26	The First Isomorphism Theorem, Examples
10.28	Problems
10.31	Homework #3 Due. Problems
11.02	Chapter 11: Fundamental Theorem of Finite Abelian Groups.
11.04	The isomorphism Classes of Abelian Groups.
11.07	Problems
11.09	Chapter 12: Introduction to Rings, Definition and Examples
11.14	Properties of Rings, Subring Test
	Problems
11.16	Review
11.18	Test 3
11.21	Chapter 13 Integral Domains: Definitions and Examples
11.23	Fields, Characteristic of a ring
11.28	Problems
11.30	Problems
12.02	Review

12.07, Wednesday, 2-3:50 pm – Comprehensive Final Exam

Note. The above tentative schedule is subject to change per instructor's notice posted on Blackboard and announced in class.

IX. Teaching Strategies

The teaching strategies for this course will be: Lectures and Group Discussions

X. Bibliography

Jimmie Gilbert, Linda Gilbert, Elements of Modern Algebra, Brooks/Cole, Sixth Edition, 2005
Aigli Papantonopoulou, Algebra: Pure and Applied, Prentice Hall, First Edition, 2002.
Joseph J. Rotman, A First Course in Abstract Algebra, Prentice Hall, Third Edition, 2006.