Fayetteville State University
College of Arts and Sciences
Department of Mathematics and Computer Science
Fall 2011

In case FSU must close for an emergency during the semester, instruction will continue using Blackboard.

I. Locator Information

Instructor: Dr. Vassil Yorgov
Course Number and Name: MATH511-01, Abstract Algebra I
Semester Credit Hours: 3
Day and Time Class Meets: Monday, Wednesday 6:00-7:15 p.m.
Total Contact Hours for Class: 45
Email address: vyorgov@uncfsu.edu
Office Location: SBE 342
Office hours: MW 4-6 p.m. and TR 9 -11 a.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.

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II. Course Description

The first course of a two-semester sequence in abstract algebra, including such topics as groups, normal subgroups, quotient groups, homomorphisms, Cayley's Theorem, Cauchy's Theorem, permutation groups, Sylow's Theorem, direct products, finite abelian groups, rings, ring homomorphisms, ideals, quotient rings, Euclidean rings, and polynomial rings. *Prerequisite: MATH 362, or consent of department*

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

Abstract Algebra (3rd Edition), David S. Dummit, Richard M. Foote, John Wiley & Sons, New York 2003.

V. Student Learning Outcomes

Upon completion of this course, students will be able to:

- Give the definition, provide examples, and prove basic properties of groups.
- Prove the Fundamental Theorem of Cyclic Groups.
- Make computations in permutation groups.
- Formulate the Cayley's Theorem and the Sylow's Theorem.
- Give examples and apply the properties of external direct products of groups, cosets, normal subgroups, and factor groups.
- Prove the Lagrange's Theorem and its consequences.
- To use G/Z Theorem, the First Isomorphism Theorem, and the Fundamental Theorem of Finite Abelian Groups.
- Know the basic properties of unique factorization domains, principal ideals domains, and Euclidean domains.

VI. Course Requirements and Evaluation Criteria

There are three in term tests and a final exam. The main part of each test is take-home. For the **final exam** every student gives a power point or other computer aided presentation on the proof and one significant application of a theorem of his/her choice from the covered material. Grading rubric will be provided. The computer file of the presentation has to be submitted in advance to the instructor for the class records. In arriving at a test average, all in-term tests are weighted the same. A letter grade will be assigned as follows:

Tests Average: 70%; Class Attendance and Participation: 10%; Final Presentation: 20%.

Grading Scale: **A:** 90-100 **B:** 80-89 **C:** 70-79 **F:** below 69

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

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Date	Topic
08.22	Chapter 1. Introduction to Groups 1.1 Basic Axioms and Examples 1.2 Dihedral Groups
08.24	1.3 Symmetric Groups
08.29	1.4 Matrix Groups 1.5 The Quaternion Group
08.31	1.6 Homomorphisms and Isomorphisms
09.07	1.7 Group Actions
09.12	Chapter 2. Subgroups 2.1 Definitions and Examples 2.2 Centralizers and Normalizers, Stabilizers and Kernals
09.14	2.3 Cyclic Groups and Cyclic Subgroups 2.4 Subgroups Generated by Subsets of a Group
09.19	Review
09.21	**Test 1**
09.26	Chapter 3. Quotient Groups and Homomorphisms

	3.1 Definitions and Examples
09.28	3.2. More on Cosets and Lagrange's Theorem
10.03	3.3 The Isomorphism Theorems
10.05	3.5 Transpositions and the Alternating Group
10.10	Chapter 4. Group Actions 4.1 Group Actions and Permutation Representations 4.2 Group Actions on Themselves by Left Multiplication-Cayley's Theorem
10.12	4.3 Group Actions on Themselves by Conjugation-The Class Equation
10.19	4.4 Automorphisms
10.24	4.5 The Sylow Theorems
10.26	Review
11.31	**Test 2**
11.02	Chapter 5. Direct Products and Abelian Groups 5.1 Direct Products 5.2 The Fundamental Theorem of Finitely Generated Abelian Groups
11.07	Chapter 7. Introduction to Rings 7.1 Basic Definitions and Examples 7.2 Examples: Polynomial Rings, Matrix Rings, and Group Rings
11.09	7.3 Ring Homomorphisms and Quotient Rings
11.14	7.4 Properties of Ideals
11.16	Chapter 8. 8.1 Euclidean Domains
11.21	8.2 Principal Ideal Domains
11.23	**Test 3**
11.28	8.3 Unique Factorization Domains
11.30	8.3 Unique Factorization Domains

Monday, Dec. 5, 6-7:50 p.m.Final Exam

IX. Teaching Strategies

The teaching strategies for this course will be: lectures, discussions, and student presentations.

X. Bibliography

Joseph A. Gallian , Contemporary Abstract Algebra, Houghton Mifflin Company, Fourth Edition, 1998

John B. Fraleigh, A First Course in Abstract Algebra, Macmillian Publishing Co, Sixth Edition, 1999.

Aigli Papantonopoulou, Algebra: Pure and Applied, Prentice Hall, First Edition, 2002.

Joseph J. Rotman, First Course in Abstract Algebra, Prentice Hall, Second Edition, 2000.

Thomas Hungerford. Algebra, New York: Springer-Verlag, 2000