MA361 – Abstract Algebra II **Spring 2019**
TTh 11:00 a.m.–12:15 p.m. (W-1-62)

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Course Description

Math 361 is a continuation of Math 360. We will study the basic structures of modern algebra (groups, rings, and fields) in greater depth, culminating with the systematic study of symmetry groups of extension fields and its implications for solvability of polynomial equations by radicals (Galois theory).

Prerequisites

Admission to the course is contingent upon successful completion of MA360.

Text

There is one required text for the course: *A First Course in Abstract Algebra*, Seventh Edition, by John Fraleigh.

Grading

Course grades are based on weekly quizzes (20%), two in-class tests (20% each), and a cumulative final exam (40%).

Reading and class preparation

There is a reading assignment associated with each class period. Although it is not generally possible to discuss every topic in class, students are responsible for the entire content of the reading assignment. *Test and exam questions may cover reading material not discussed explicitly in class.* Consequently it is very important to complete the reading assignments on time and to come to class prepared with questions.

Make-up tests

Tests may be rescheduled only in cases of serious illness, bereavement, or other circumstances of similar gravity. Whenever possible, arrangements for make-up tests must be made *in advance* of the regularly scheduled testing time.

Accomodations for students with disabilities

Section 504 of the Americans with Disabilities Act of 1990 offers guidelines for curriculum modifications and adaptations for students with documented disabilities. If applicable, students may obtain adaptation recommendations from the Ross Center for Disability Services, CC-UL-211, (617-287-7430). The student must present these recommendations and discuss them with each professor within a reasonable period, preferably by the end of the Drop/Add period.

Student conduct

Students are required to adhere to the University Policy on Academic Standards and Cheating, to the University Statement on Plagiarism and the Documentation of Written Work, and to the Code of Student Conduct. The Code is available online at the following web site:

`https://www.umb.edu/editor_uploads/images/life_on_campus/Code_of_Conduct_5-14-14.pdf`

Please pay particular attention to Section XII, paragraphs 1 and 5. In this course, you will be permitted to use a short note sheet during exams, provided that you have prepared the sheet yourself. Your exam responses may quote your lecture notes or the course textbook without attribution, but material taken from any other source must be properly attributed to its author. In addition, the use of electronic devices during exams is *expressly prohibited*. Violation of these policies will result in disciplinary action.

Web page

This syllabus and other course materials are available on-line at

`http://cartan.math.umb.edu/wiki/index.php/Math_361,_Spring_2019`

Schedule of topics

Week 1: Introduction. Rings and fields.

Week 2: Integral domains. Direct products and the Chinese Remainder Theorem.

Week 3: Theorems of Fermat and Euler. RSA encryption.

Week 4: Field of fractions of an integral domain. Rings of polynomials.

Week 5: Factorization of polynomials over a field.

Week 6: First midterm (Tuesday, March 5; covers assignments 1–4). Prime ideals and maximal ideals.

Week 7: Introduction to extension fields. Vector spaces.

Week 8: Algebraic extensions.

Week 9: Finite fields. Unique factorization domains.

Week 10: Euclidean domains. Gaussian integers and multiplicative norms.

Week 11: Second midterm (Tuesday, April 16; covers assignments 5–9).Group actions.

Week 12: The Sylow theorems.

Week 13: Applications of Sylow theory. Introduction to Galois theory.

Week 14: The Galois correspondence and solvability by radicals.

Week 15: Epilogue: Algebraic Geometry and elliptic curve cryptography.