MA361 – Abstract Algebra II **Spring 2017**
TTh 11:00 a.m.–12:15 p.m. (Y-4-4190)

Instructor: Steven Jackson
Office: Sci-3-082
Office hours: by appointment
E-mail: jackson@math.umb.edu
Phone: (617) 287-6469
URL: www.math.umb.edu/~jackson/

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_2017`

Course Calendar

Homework problems should be done prior to the due date but ***are not to be handed in.*** *One problem from each assignment will appear on the weekly quiz.*

Tuesday, January 24: Introduction.

Thursday, January 26: The CRT revisited, the totient function, and the theorems of Fermat and Euler.

Read before class: Section 20.

Tuesday, January 31: Field of fractions of an integral domain.

Read before class: Section 21.

Do before class: Assignment 1.

Thursday, February 2: Rings of polynomials.

Read before class: Section 22.

Tuesday, February 7: Factorization of polynomials over a field.

Read before class: Section 23.

Do before class: Assignment 2.

Thursday, February 9: More on factorization of polynomials.

Tuesday, February 14: Prime ideals and maximal ideals.

Read before class: Section 27.

Do before class: Assignment 3.

Thursday, February 16: Introduction to extension fields.

Read before class: Section 29.

Tuesday, February 21: Vector spaces.

Read before class: Section 30.

Do before class: Assignment 4.

Thursday, February 23: Algebraic extensions.

Read before class: Section 31.

Tuesday, February 28: Geometric constructions.

Read before class: Section 32.

Do before class: Assignment 5.

Thursday, March 2: Finite fields.

Read before class: Section 33.

Tuesday, March 7: Exam 1 (sections 20, 21, 22, 23, 27, 29, 30, and 31; assignments 1–5).

Do before class: Assignment 6

Thursday, March 9: More on finite fields.

Tuesday, March 21: Isomorphism theorems.

Read before class: Section 34.

Do before class: Assignment 7.

Thursday, March 23: Series of groups.

Read before class: Section 35.

Tuesday, March 28: Groups acting on sets.

Read before class: Section 16.

Do before class: Assignment 8.

Thursday, March 30: Sylow theorems.

Read before class: Section 36.

Tuesday, April 4: Applications of Sylow theory.

Read before class: Section 37.

Do before class: Assignment 9.

Thursday, April 6: Free groups.

Read before class: Section 39.

Tuesday, April 11: Exam 2 (sections 32, 33, 34, 35, 16, and 36; assignments 6–9).

Do before class: Assignment 10.

Thursday, April 13: Presentations of groups.

Read before class: Section 40.

Tuesday, April 18: Unique factorization domains.

Read before class: Section 45.

Do before class: Assignment 11.

Thursday, April 20: Euclidean domains.

Read before class: Section 46.

Tuesday, April 25: Gaussian integers and multiplicative norms.

Read before class: Section 47.

Do before class: Assignment 12.

Thursday, April 27: Overview of Galois theory, lecture 1.

Tuesday, May 2: Galois theory, lecture 2.

Do before class: Assignment 13.

Thursday, May 4: Galois theory, lecture 3.

Tuesday, May 9: Epilogue: abstract algebra, categories, and the structure of modern mathematics.

Do before class: Assignment 14.