MA361 – Abstract Algebra II

Instructor: Steven Jackson
Office: Sci-3-082
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.

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 as delineated in the catalog of Undergraduate Programs, pp. 44–45 and 48–52. The Code is available online at the following web site:

`http://www.umb.edu/editor_uploads/images/life_on_campus/CSC.pdf`

Web page

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

`http://cartan.math.umb.edu/wiki/index.php/Math_361,_Spring_2015`

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.*

Thursday, January 29: Introduction.

Tuesday, February 3: Factorization of polynomials.

Read before class: Section 23.

Do before class: Assignment 1.

Thursday, February 5: Morphisms and quotient rings.

Read before class: Section 26.

Tuesday, February 10: Prime ideals and maximal ideals.

Read before class: Section 27.

Do before class: Assignment 2.

Thursday, February 12: Introduction to extension fields.

Read before class: Section 29.

Tuesday, February 17: Vector spaces.

Read before class: Section 30.

Do before class: Assignment 3.

Thursday, February 19: Algebraic extensions.

Read before class: Section 31.

Tuesday, February 24: Geometric constructions.

Read before class: Section 32.

Do before class: Assignment 4.

Thursday, February 26: Finite fields.

Read before class: Section 33.

Tuesday, March 3: Isomorphism theorems.

Read before class: Section 34.

Do before class: Assignment 5.

Thursday, March 5: Series of groups.

Read before class: Section 35.

Tuesday, March 10: Exam 1 (sections 23, 26, 27, 29, 30, 31, 32, and 33; assignments 1–5)

Do before class: Assignment 6.

Thursday, March 12: Sylow theorems.

Read before class: Section 36.

Tuesday, March 24: Applications of the Sylow theory.

Read before class: Section 37.

Do before class: Assignment 7.

Thursday, March 26: Free groups.

Read before class: Section 39.

Tuesday, March 31: Group presentations.

Read before class: Section 40.

Do before class: Assignment 8.

Thursday, April 2: Unique factorization domains.

Read before class: Section 45.

Tuesday, April 7: Euclidean domains.

Read before class: Section 46.

Do before class: Assignment 9.

Thursday, April 9: Gaussian integers and multiplicative norms.

Read before class: Section 47.

Tuesday, April 14: Exam 2 (sections 34, 35, 36, 37, 39, 40, and 45; assignments 6–9).

Do before class: Assignment 10.

Thursday, April 16: Splitting field of a polynomial.

Tuesday, April 21: Uniqueness of the splitting field.

Do before class: Assignment 11.

Thursday, April 23: Solvability by radicals.

Tuesday, April 28: The Galois group.

Do before class: Assignment 12.

Thursday, April 30: The Galois correspondence. Obstructions to bijectivity of the correspondence.

Tuesday, May 5: Normality and separability.

Do before class: Assignment 13.

Thursday, May 7: The fundamental theorem of Galois theory.

Tuesday, May 12: Review.

Do before class: Assignment 14.