MA361 – Abstract Algebra II

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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.

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_2013`

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 29: Introduction.

Thursday, January 31: The field of fractions of an integral domain.

Read before class: Section 21.

Tuesday, February 5: Rings of polynomials.

Read before class: Section 22.

Do before class: Assignment 1.

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

Read before class: Section 23.

Tuesday, February 12: Homomorphisms and factor rings.

Read before class: Section 26.

Do before class: Assignment 2.

Thursday, February 14: Prime ideals and maximal ideals.

Read before class: Section 27.

Tuesday, February 19: Introduction to extension fields.

Read before class: Section 29.

Do before class: Assignment 3.

Thursday, February 21: Vector spaces.

Read before class: Section 30.

Tuesday, February 26: Algebraic extensions.

Read before class: Section 31.

Do before class: Assignment 4.

Thursday, February 28: Geometric constructibility.

Read before class: Section 32.

Tuesday, March 5: Test 1 (sections 21, 22, 23, 26, 27, 29, 30, and 31).

Do before class: Assignment 5.

Thursday, March 7: Finite fields.

Read before class: Section 33.

Tuesday, March 12: Isomorphism theorems.

Read before class: Section 34.

Do before class: Assignment 6.

Thursday, March 14: Series of groups.

Read before class: Section 35.

Tuesday, March 26: Sylow theorems.

Read before class: Section 36.

Do before class: Assignment 7.

Thursday, March 28: Applications of Sylow theory.

Read before class: Section 37.

Tuesday, April 2: Free abelian groups.

Read before class: Section 38.

Do before class: Assignment 8.

Thursday, April 4: Free groups.

Read before class: Section 39.

Tuesday, April 9: Group presentations.

Read before class: Section 40.

Do before class: Assignment 9.

Thursday, April 11: Unique factorization domains.

Read before class: Section 45.

Tuesday, April 16: Test 2 (sections 32, 33, 34, 35, 36, 37, 38, 39, and 40).

Do before class: Assignment 10.

Thursday, April 18: Euclidean domains.

Read before class: Section 46.

Tuesday, April 23: Gaussian integers and multiplicative norms.

Read before class: Section 47.

Do before class: Assignment 11.

Thursday, April 25: Galois theory: lecture 1.

Tuesday, April 30: Galois theory: lecture 2.

Do before class: Assignment 12.

Thursday, May 2: Galois theory: lecture 3.

Tuesday, May 7: Galois theory: lecture 4.

Do before class: Assignment 13.

Thursday, May 9: Galois theory: lecture 5.

Tuesday, May 14: Summary.

Do before class: Assignment 14.