MA360 – Abstract Algebra I

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Course Description

Math 360 is an introduction to the basic structures of modern algebra: groups, rings, and fields. Its continuation, Math 361, studies these structures in greater depth, culminating in an introduction to Galois theory.

Prerequisites

Admission to the course is contingent upon successful completion of MA260 or an equivalent linear algebra course.

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_360,_Fall_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.*

Wednesday, September 4: Introduction.

Friday, September 6: Sets and relations.

Read before class: Section 0.

Monday, September 9: Roots of unity.

Read before class: Section 1.

Do before class: Assignment 1.

Wednesday, September 11: Binary operations.

Read before class: Section 2.

Friday, September 13: Isomorphic binary structures.

Read before class: Section 3.

Monday, September 16: More on isomorphic structures.

Do before class: Assignment 2.

Wednesday, September 18: Groups.

Read before class: Section 4.

Friday, September 20: Subgroups.

Read before class: Section 5.

Monday, September 23: More on subgroups.

Do before class: Assignment 3.

Wednesday, September 25: Cyclic groups.

Read before class: Section 6.

Friday, September 27: Generating sets and Cayley graphs.

Read before class: Section 7.

Monday, September 30: More on generating sets.

Do before class: Assignment 4.

Wednesday, October 2: Groups of permutations.

Read before class: Section 8.

Friday, October 4: Orbits, cycles, and the alternating groups.

Read before class: Section 9.

Monday, October 7: More on orbits, cycles, and the alternating groups.

Do before class: Assignment 5.

Wednesday, October 9: Exam 1 (sections 0, 1, 2, 3, 4, 5, 6, and 7).

Friday, October 11: Cosets and Lagrange's Theorem.

Read before class: Section 10.

Wednesday, October 16: Direct products and finitely generated abelian groups.

Read before class: Section 11.

Do before class: Assignment 6.

Friday, October 18: More on direct products and finitely generated abelian groups.

Monday, October 21: Plane isometries.

Read before class: Section 12.

Do before class: Assignment 7.

Wednesday, October 23: Homomorphisms.

Read before class: Section 13.

Friday, October 25: More on homomorphisms.

Monday, October 28: Factor groups.

Read before class: Section 14.

Do before class: Assignment 8.

Wednesday, October 30: Factor groups computations and simple groups.

Read before class: Section 15.

Friday, November 1: More on factor groups computations and simple groups.

Monday, November 4: Groups acting on sets.

Read before class: Section 16.

Do before class: Assignment 9.

Wednesday, November 6: Exam 2 (sections 8, 9, 10, 11, 12, 13, 14, and 15).

Friday, November 8: Application of G-sets to counting.

Read before class: Section 17.

Wednesday, November 13: More on G-sets and counting.

Do before class: Assignment 10.

Friday, November 15: Rings and fields.

Read before class: Section 18.

Monday, November 18: Integral domains.

Read before class: Section 19.

Do before class: Assignment 11.

Wednesday, November 20: More on integral domains.

Friday, November 22: Fermat's and Euler's theorems.

Read before class: Section 20.

Monday, November 25: Fields of fractions.

Read before class: Section 21.

Do before class: Assignment 12.

Wednesday, November 27: More on fields of fractions.

Monday, December 2: Rings of polynomials.

Read before class: Section 22.

Do before class: Assignment 13.

Wednesday, December 4: Factorization of polynomials over a field.

Read before class: Section 23.

Friday, December 6: More on factorization.

Monday, December 9: Homomorphisms and factor rings.

Read before class: Section 26.

Do before class: Assignment 14.

Wednesday, December 11: Prime ideals and maximal ideals.

Read before class: Section 27.

Friday, December 13: More on prime ideals and maximal ideals.

Do before class: Assignment 15.