MAS 4301 – Abstract Algebra 1 – Summer C 2014

Course Syllabus

Instructor
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Lectures
    217 Little Hall, MWF2
Office Hours
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Description

This is the first semester of the Mathematics Department's undergraduate level course in abstract algebra. The text is the 8th edition of Gallian's *Abstract Algebra*, and we will try to cover the first 15 chapters: group theory and an introduction to ring theory. This is an ambitious project and we will have to move fairly rapidly.

Prerequisites

MAS 4105 (Linear Algebra) is required. The student should be adept at reading and writing proofs.

Course Structure and Grading

The course grade will be based on weekly homework assignments, and 3 midterm exams. Homework will be graded for (a) completeness and (b) correctness of selected problems
Each exam will count for 25% of the grade, and the total of the homework for the remaining 25%. When the final percentages have been computed, letter grades will be assigned as follows: A, 90-100%; B, 80-89%; C, 70-79%; D, 60-69%; E 59% or under. Plus or minus grades will be given to students within a point or two of a grade boundary. The exact grading scale may be adjusted after the second exam.

All assignments, as well as the dates of the exams are listed below

Course Policies

It is assumed that the student is familiar with the University's Academic Honesty Policies.

Attendance will not be taken, but it is the student's responsibility to attend classes, and to get notes for the lectures if a class must be missed.

Late homework will *not* be accepted. Makeups for exams must arranged in advance, except in the case of a documented medical emergency. Homework may be submitted by email; please use PDF files for this purpose.

Students requiring accommodation for disabilities must make arrangements through the office of the Dean of Students.

Please silence all cell phones.

Schedule of Assignments and Exams

Exam Dates: June 6, July 11, August 8 (all Fridays).

Assignment One – Due May 19

Read Chapter 0 of the text, and do the following problems:

    Ch. 0: 1-4, 8, 12, 16, 18, 28, 34, 59, 60.

Assignment Two – Due May 28

Read Chapters 1 and 2, then do the following problems:

    Ch. 1: 2, 11, 16
    Ch. 2: 5, 11, 20, 22, 25, 33, 34, 48, 51

Assignment Three – Due June 2

    Ch. 3: 1, 2, 4, 10, 20, 26, 31, 32, 35, 37, 38, 45, 50, 60, 68

Exam One – Friday June 6

The exam will cover chapters 0-3. Be sure to review all assigned work. You will want to review carefully the following topics:

    Euclid's algorithm

    Induction

    Equivalence relations

    Symmetries, the dihedral group

    Subgroups and subgroup tests

Equivalence relations
Symmetries, the dihedral group
Subgroups and subgroup tests

Here are the solutions   for the first exam.

Assignment Four – Due June 9

Ch. 4: 13, 20, 28, 29, 33, 40, 42, 43, 58, 62, 63, 78, 79, 84

Assignment Five – Due June 16

Ch. 5: 1-3, 5, 6, 8, 10, 14, 22, 29, 31, 33, 35, 40, 54

Assignment Six – Due June 30

Read chapter 6 and the first three pages of chapter 10 (pp. 208-210 in the 8th edition). Then do the following problems:

Ch. 6: 1-5, 8, 16, 22, 23, 26, 36, 42, 58, 60
Ch. 10: 5, 6, 24

Assignment Seven – Due July 7

Read chapter 7 and do the following problems:

Ch. 7: 1, 5, 7, 13, 20, 23, 24, 26, 28, 30, 38, 40, 44, 51, 52

Exam Two: July 11

The exam will cover chapters 4-7 and a small amount of material from chapter 10 (the first three pages; don't worry about kernels of homomorphisms). Topics to study:

cyclic groups, structure theorem
permutation groups, cycle decomposition, order of a permutation, even and odd permutations.
isomorphisms, homomorphisms, automorphisms and their properties. Cayley's theorem.
cosets, Lagrange's theorem and its consequences.

Solutions   to homework problems, chapters 4-7.

Assignment Eight: Due July 14

Read chapter 8 and do the following problems:

Ch. 8: 4, 6, 8, 9, 14, 16, 22, 26, 36, 38, 52, 53, 66, 67, 70, 71, 72, 73

Assignment Nine: Due July 23

Read chapter 9 and do the following problems:

Ch. 9: 7, 8, 10, 12, 13, 21, 24, 30, 33, 36, 46, 48, 54, 56, 62

Assignment Ten: Due July 28

Tuesday office hours this week are 1:30-2:15PM. Friday office hours as usual.

Read chapters 10 and 11 (you've already read a bit of 10) and do the following problems:

Ch. 10: 11, 13, 37, 41, 42, 61
Ch. 11: 6, 7, 8, 9, 10, 16, 21, 26, 27

Assignment Eleven: Due August 4

From now on we will be skipping about rather a lot. Read chapter 12, pages 267-271 of chapter 14, and pages 285-289 of chapter 15. Then do the following problems:

Ch. 12: 2, 6, 9, 13, 19, 22, 32, 50
Ch. 14: 4, 12, 14, 16, 28, 46
Ch. 15: 8, 13, 16, 42

Assignment Twelve: Due August 6

Read chapter 13 and the remaining portions of 14 and 15, and do the following problems:

Ch. 13: 14, 15, 18, 20, 28, 30, 34, 35, 51, 63
Ch. 14: 36, 37, 38, 45, 53
Ch. 15: 44, 46, 48

Read chapter 15 and the remaining portions of 14 and 15, and do the following problems.

Ch. 13: 14, 15, 18, 20, 28, 30, 34, 35, 51, 63

Ch. 14: 36, 37, 38, 45, 53

Ch. 15: 44, 46, 48

Exam Three: August 8

Solutions   for the problems through the assignment 11. Updated: all graded problems are now solved, and problem #53 in chapter 8 has been corrected.

The exam will consist of six questions, as usual, of which 3 will be on group theory and 3 will be on rings. You will want to review all assigned problems, with special attention to the following topics:

Structure theorem for abelian groups

The groups $U(n)$

Normal subgroups

Subrings, ideals

The first isomorphism theorem for both groups and rings

Integral domains, prime and maximal ideals

The alternating group will make a brief appearance

Final Grades

Final grades have been submitted to the Registar. In the end, letter grades were assigned on the following basis: A, 80-100%; B, 65-79.9%; C, 55-64.9%; D, 45-54.9%; E, below 45%. If you wish to know your exam grade or final course grade, please email me. If you wish to see your exam, please make an appointment to see me during the first week of the fall semester. I will not have regular office hours during the semester break.