Math 262: Abstract Algebra

Section 1: Monday, Wednesday, Friday, 10:00 – 10:50am, Exley 137
Spring 2016

Instructor: Vince Guingona
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Office: 649 Exley Science Center
Office Hours: Wednesday 1-3pm, Thursday 3-4pm, and by appointment
Recitation Sections: TBD

Textbook: *Abstract Algebra*, Third Edition by Hungerford.

Moodle: All course material for Math 262 will be online on Moodle.

Introduction: Welcome to Math 262, *Abstract Algebra*! This class is the continuation of Math 261, which is therefore a prerequisite. In *Abstract Algebra*, will be covering three basic topics: rings, fields, and Galois Theory. The idea behind abstract algebra is to generalize structures we commonly encounter in mathematics, like the integers and the real numbers, and gain a deeper understanding of them. The prototypical example of a ring is the integers, $\mathbb{Z}$, and intuition about the integers will help guide us through understanding rings in general. Fields are just special types of rings with multiplicative inverses. Our favorite examples of fields include the rationals, $\mathbb{Q}$, the reals, $\mathbb{R}$, and the complex numbers, $\mathbb{C}$. Although we will study these fields in particular, we will be primarily interested in general properties of fields. Finally, at the end of the course, we will study Galois Theory, which establishes a connection between field theory and group theory. For example, it we will discover why some polynomials with degree greater than four do not have solutions that can be constructed with field operations and roots. Moreover, we will see why there are limitations to certain "compass and straightedge" constructions.

Homework: Homework will be assigned weekly and will consist of a list of problems from the textbook, possibly supplemented by extra questions. The homework assignments will be posted on the course Moodle. Homework will be due on Fridays by 5pm, to be turned into the box outside my office. Assignments may also be given to me in class on the day that they are due. Late homework will not be accepted. You are permitted to work on the homework in groups, but each person must write up and turn in her or his own solutions. Please show all of your work on each problem. Homework will be worth 20% of your total grade.

Exams: There will be two midterms and one final exam. The midterms will be take-home midterms, similar to homework assignments. Please work on these individually without collaboration with other students. Each midterm will be worth 20% of your total grade. The in-class final will cover all the material from the entire course, though it will focus on the material covered after the second midterm. The final exam will be on **Thursday, May 12th from 7pm to 10pm in Exley 137**. The final will be worth 40% of your total grade. Although the final is closed-book, you may use the book for the two midterms.

Grading: Your grade will be calculated with the following breakdown:

Homework : 20% – Midterm 1 : 20% – Midterm 2 : 20% – Final : 40%.

Your letter grade will be given by the following chart:

Grade	Letter
97 – 100%	A+
93 – 96.99%	A
90 – 92.99%	A-
87 – 89.99%	B+
83 – 86.99%	B
80 – 82.99%	B-
77 – 79.99%	C+
73 – 76.99%	C
70 – 72.99%	C-
67 – 69.99%	D+
63 – 66.99%	D
60 – 62.99%	D-
57 – 59.99%	E+
53 – 56.99%	E
50 – 52.99%	E-
0 – 49.99%	F

Tentative Class Schedule:

Week	Dates	Sections	Topics
1	1/22	3.1	Definition of Rings
2	1/25, 1/27, 1/29	3.1, 3.2	Basic Properties of Rings
3	2/1, 2/3, 2/5	3.3, 4.1	Homomorphisms / Polynomials
4	2/8, 2/10, 2/12	4.2, 4.3	Divisibility, Irreducibles, and Unique Factorization
5	2/15, 2/17, 2/19	4.4, 5.1	Roots and Congruences
6	2/22, 2/24, 2/26	5.2, 5.3, 6.1	Congruences and Ideals
7	2/29, 3/2, 3/4	6.2, 6.3	Quotient Rings and Homomorphisms
Spring Break			
8	3/21, 3/23, 3/25	10.1, 10.2	EDs, PIDs, and UFDs
9	3/28, 3/30, 4/1	10.3, 10.4	Factorization and Field of Quotients
10	4/4, 4/6, 4/8	10.5, 11.1	Polynomials over UFDs / Vector Spaces
11	4/11, 4/13, 4/15	11.2, 11.3	Simple and Algebraic Extensions
12	4/18, 4/20, 4/22	11.4, 11.5, 11.6	Splitting Fields, Separability, and Finite Fields
13	4/25, 4/27, 4/29	12.1, 12.2	The Fundamental Theorem of Galois Theory
14	5/2, 5/4	12.3	Solvability by Radicals
15	5/12		Final Exam

Getting Help: This is a fast-paced course, so you may occasionally need assistance with the material covered. There are several resources outside of the classroom to help you with this:

- **Office Hours:** I will hold office hours on Wednesdays from 1 to 3pm and on Thursdays from 3 to 4pm. I am also available at other times, but you will need to make an appointment via email. Feel free to ask me any questions you have relating to the course during office hours.
- **Recitations:** I will hold recitation sections for this course. The time and location for these are to be determined.

Special Accommodations Policy: According to official policy:

> *Wesleyan University is committed to ensuring that all qualified students with disabilities are afforded an equal opportunity to participate in and benefit from its programs and services. To receive accommodations, a student must have a documented disability as defined by Section 504 of the Rehabilitation Act of 1973 and the ADA Amendments Act of 2008, and provide documentation of the disability. Since accommodations may require early planning and generally are not provided retroactively, please contact Disability Resources as soon as possible. If you believe that you need accommodations for a disability, please contact Dean Patey in Disability Resources, located in North College, Room 021, or call 860-685-5581 for an appointment to discuss your needs and the process for requesting accommodations.*

If you require accommodations, please make an appointment with me during the first two weeks of class so that we can make the appropriate arrangements.

Wesleyan Honor Code: Please follow the Wesleyan Honor Code (*id est*, don't cheat!). For each homework and exam, the pledge states:

> *In accordance with the Honor Code, I affirm that this work has been completed without improper assistance.*

See the Student Handbook for more information.

Conclusion: Thanks for signing up for my course. I hope we have an enjoyable semester together!

Last Updated: December 9, 2015