

Math 412 – Winter 2024

Please refer to Canvas for the most up to date syllabus

Instructor:

Name: Miao (Pam) Gu (She/her)

Call me: Pam

Email: pmgu@umich.edu

Office: East Hall 4827

Course webpage: This is an abbreviated syllabus. All course materials and information will be posted on Canvas. *Please direct to the Canvas page for information on office hours, course assistants and more. If you are having problems accessing Canvas notify me by email.*

Textbook: *Abstract Algebra: An Introduction* by Thomas W. Hungerford, 3rd edition. Earlier editions are great but homework numbering and page numbers may differ. *It will be your responsibility to match things up if you use an older edition.*

Prerequisites: Math 215 or 285; and Math 217. If you have not finished these prerequisites, you should speak with your academic advisor and me.

Course Description: Math 412 is an introduction to abstract algebra, required for all math majors but possibly of interest also to physicists, computer scientists, and lovers of mathematics. We will begin with ring theory: our first goal is to prove the Fundamental Theorem of Arithmetic, about the ring you've been studying since elementary school, the integers. We will continue by studying basic properties of rings and ring homomorphism (ideals, quotient rings, fields). Here, another important example, which shares many properties with the ring of integers, is the ring of polynomials over a field. Finally, we will study the basics of group theory (groups, group homomorphisms, symmetry groups, the symmetric group, normal subgroups, quotient groups, and group actions on sets). In addition to developing many examples, students will prove nearly all statements in this course.

Course expectations: Math 412 students are responsible for *learning material on their own through individual reading of the relevant portions of the textbook listed on Canvas before coming to class*. You will often work together on more theoretical concepts in small groups using worksheets in class. You will be expected to work out more computational exercises on your own, which will be supplemented with some webwork when possible. Pay attention to the following:

- WeBWorK, due Mondays at 11:59 pm, starting Monday, January 22nd. The lowest webwork score will be dropped,
- Homework sets, due Thursdays at 11:59 pm, starting Thursday, January 25th, submitted to Gradescope. The lowest homework set score will be dropped.
- In-class quizzes once a week. The lowest quiz score will be dropped,
- Midterm exam on Thursday, March 7th, 7:00 - 9:00 pm, at WEIS260.

- The final (cumulative) exam, date / time / location: TBA (soon!).

Participation: Participation is an important component of this course, as much of your learning will take place during group work in class. Participation grade will be awarded to students who consistently attend and work in class. Some student may face issues that prevent them from attending class. Thus, we will use the following policy. You are required to attend class whenever possible, and *if you need to miss a class, you must do the following:*

- Email me ahead of time, saying that you will not be present, at least an hour before class. I need to know who to expect in class ahead of time for the purpose of planning out group work.
- Write up your solution to one worksheet problem *by the next class period* and email the instructor. For example, if you miss a Tuesday class, you must write and upload your solution (note that one worksheet problem may consist of multiple parts!) by the start of Thursday's class.
- If you miss more than three class periods, you are required to have a meeting with me.

Grading: Quizzes (10%), Participation (5%), Webwork (10%), Homework (20%), Midterm (25%), Final exam (30%)

Accommodations for students with disabilities: If you need an accommodation for a disability, please let me know as soon as possible. An Accommodation letter through Accommodate must be provided to me at least two weeks prior to the need for a test accommodation. The Services for Students with Disabilities (SSD) Office (G664 Haven Hall; <http://ssd.umich.edu/>) issues accommodate letters.

Advice on how to succeed in this course:

- Come prepared! Always read the section we will cover before class.
- Come to class on time and don't leave early.
- We'll get through the essential part of the worksheets in class, but it is highly recommended that you also attempt the remaining problems afterwards, as they are included there for you to get good practice on the material.
- Worksheets contain important theorems and definitions. It is a good idea to make a document with all of them, so that you have easy access to all of them together. This is especially useful for those results that differ from the ones in the textbook.
- Start the written problem set and webwork early! You should make major progress over the weekend so that you can ask questions in office hours.
- Form a study group. Your classmates are one of your greatest resources, both in and out of class. Group work is highly encouraged!
- Check your work on problem sets and worksheets against the answers provided to make sure you did not overlook any subtleties, and ask about any details you might have missed.
- Get help in the office hours when needed. You can attend office hours of the instructor and any of the course assistants for Math 412, which are posted on canvas.
- We all make mistakes at some point. Be patient and kind to yourself and to others when mistakes happen, and focus on learning from them.