

Instructor: Dr. Miriam Kuzbary
Time: MWF 12:30-1:20PM
Office: Skiles 014
Classroom: Skiles 202
Email: kuzbary AT gatech.edu
Office Hours: Tuesday 9-10am on Zoom, Wed 9-10am in my office, and by appointment through email
Class Webpage: Canvas
Grader:
Email:
Office Hours:

Course Description:

In this class we will begin the study of abstract algebra. Together we will learn deep ideas about algebra, formally and precisely prove results based on these ideas, and build a framework for ourselves connecting these ideas together. The main objectives of this course are for you to...

- Demonstrate fluency with the precise formal definitions of fundamental objects in the study of groups, rings, and fields as well as related definitions and theorem statements,
- Recognize patterns, formulate conjectures about those patterns, and prove or disprove said conjectures,
- Write clear and cogent proofs of the statements, propositions, and theorems contained in this course, and
- Demonstrate an understanding of the logical flow of the results in this course.

Pre-Requisites:

MATH 2106: Foundations of Mathematical Proof or MATH 2406: Abstract Vector Spaces

Required Text:

Concrete Abstract Algebra: From Numbers to Gröbner Bases by Niels Lauritzen. If you have any trouble obtaining this textbook, please email me. Note that you are responsible for all of the information in this syllabus, so please read it carefully and refer back to it regularly.

Course Expectations:

Learning new mathematics takes a lot of work and often takes time to process and internalize. As this is an advanced mathematics course, you will be expected to write mathematics clearly and precisely which is a skill that will take time and practice. As a result, it is extremely important to attend class regularly, carefully go through proofs we learn in class, and work on proofs and examples in real-time along with the lectures. It is your responsibility to check both your Georgia Tech email address and the course Canvas page to keep informed of any announcements, homework assignments, quizzes, syllabus adjustments, or policy changes made during scheduled classes.

During our lecture time we will have many conversations about what we are learning, so come to class expecting that you will be both contributing to the discussion and taking away something interesting to think about. We are creating this class together. There will be many opportunities to work with your peers in groups and your input will be regularly solicited both in the lecture

chat and verbally. Our class time is your opportunity to think out loud, make mistakes, and ask questions!

As with any upper level math class, simply attending lectures will not be enough to succeed in the course. It is important you spend time outside of class actively reading the course textbook and that you study regularly, regardless of whether you have an assessment looming on the horizon. It is essential that you start your homework early enough to be able to ask questions about it in office hours and have conversations about it with your peers in class. Having made it this far in your undergraduate mathematics career, you certainly have your own tools for learning new mathematics. If you find yourself wanting to try more strategies, some things that may be helpful to you are:

- Come to office hours regularly, even if you don't have your own question! Someone else might ask a question that is relevant to you.
- Take notes during class, and after class summarize or outline the notes for yourself in a separate document.
- Summarize or outline the definitions, propositions, theorems, and conjectures for yourself while you are reading the text.
- Try to prove results from class for yourself without looking at the lecture notes, then, compare the proof you came up with to the proof we did together or you found in the book! Even if your proof is very different or you could not finish it your way, you will likely learn a lot from the experience.
- Discuss ideas from class with your peers in a respectful way, making sure everyone involved in the conversation is able to speak and work through problems together.
- Google strategies for succeeding in upper level mathematics classes! There are many mathematicians in the world, and we all have different perspectives on how to effectively learn advanced mathematics and communicate it in a useful way.

Course delivery, attendance, and illness policy: This course is scheduled to take place in person, but I will post materials from the class on Canvas and, if necessary, recordings from classes as well. Georgia Tech highly encourages all students, faculty, staff, and visitors to get COVID-19 vaccinations and additional boosters when necessary, and for the current University guidance see *the Stamps website*. The University System of Georgia encourages people to wear masks based on their preference and assessment of personal risk. If you are showing symptoms of a contagious illness and/or testing positive for COVID-19 on a regular class day, please follow the GT *isolation and quarantine guidelines* and do not come to class. If it is an exam day, please email me immediately to schedule a makeup exam.

Since school during the pandemic has had a mix of delivery styles and many students report their attention spans and ability to engage in lecture has gone down, here is some advice on how to get the most out of our time together:

- Eliminate distractions as best you can while you participate in live lecture, read lecture notes from previous classes, or, if applicable, watch lecture recordings.

- Our brains are not usually physically able to “multitask,” i.e. do multiple things in parallel. Instead, our brains switch very quickly between tasks. This means when you have multiple things going on when you are trying to learn a new thing, your brain cannot as easily internalize the thing you are trying to learn even though you are paying attention. For peer reviewed research about this in the study of cognition, see *Mayer and Moreno 2003*, *Junco 2012*, and *Junco and Cotten 2012*.
- Work problems along with the lecture, even if you are going through the posted notes later.
- If you are unable to attend lecture at the normal time, read the posted lecture notes and watch available recordings, write down questions you have, and email them to me.

Proof Standards: The vast majority of your submitted work in this class will consist of proofs. Your proofs should be clearly written in full sentences with well-supported arguments. Aim to write so that a classmate with a current C average in the course could follow your argument; short proofs with reasoning like “clearly,” “obviously,” or “trivially” are likely not going to get full credit. This course is about mastering the fundamentals of abstract algebra, and your proofs should reflect that.

Grading: Your final grade in the class will be computed as the highest of the following schemes:

	Option 1	Option 2	Option 3
Homework	20%	20%	20%
Mastery Quizzes	5%	5%	5%
Check-In Quizzes	5%	5%	5%
Midterm 1 and 2	40% (20% each)	20% (highest test grade only)	50% (25% each)
Final Exam	30%	50%	20%

Your final grade will be assigned as a letter grade according to the following scale:

A	[90, 100]
B	[80, 90)
C	[70, 80)
D	[60, 70)
F	[0, 60)

Homework: Homework is an extremely important part of the class and counts as 20% of the final grade. Homework will be assigned and collected on a regular basis, and a subset of the problems will be graded and returned with feedback. You will be graded not only on the mathematical content of your solutions, but also on the quality of your proofs.

While collaboration is encouraged, it is important that you try as many problems as you can by yourself before consulting other sources. Resist the urge to search the internet or ask your friends who have already taken the class for solutions; this is not the way to learn the material well. *Some struggle is expected and is necessary for learning mathematics.* You are welcome to discuss the problems and solutions with your classmates, but the work you submit should be your own. If you worked with other people on the homework and/or used other people’s ideas, such as from an online source, state this clearly in the comments section when submitting your homework.

Finally, **do not give unsolicited answers to your classmates.** Again, part of the process of learning mathematics is the struggle itself, therefore 1) do not rob your colleagues of the opportunity

to figure things out, 2) your solution may not actually be correct in the first place. The ideal discussion of the homework is one where everyone involved has tried the problem already, and everyone in the discussion is given space to try out their ideas.

Homework will be due every Wednesday on Gradescope through Canvas at the beginning of class (12:30pm). All homework must be uploaded electronically. Please make sure your uploads are legible, and do not label your homework with your name anywhere on the page. I will not post solutions to homework problems.

I will accept late homework with a penalty of 25% for each late day without proper documentation. I will not accept homework later than two days except for in exceptional circumstances. If you would like to typeset your homework assignment in \LaTeX , you will earn 2 points of extra credit on the assignment for each graded problem you have typeset. However, even with extra credit your homework grade for the semester cannot exceed 100%.

Revising and resubmitting homework: On three Mondays during the semester (September 12, October 10, and November 14) you can submit a previous homework assignment through Canvas for anonymous peer feedback. If so, you will be assigned two anonymous peers to give feedback to, and must submit your feedback on their work by the following week (September 19, October 18, and November 21) which will count as extra credit towards your Check-In Quiz grade. After revising your homework based on the peer feedback you received, you are allowed to resubmit your chosen homework assignment by the following week (September 26, October 24, November 28) to improve your grade. You will not get credit for a resubmitted assignment if you did not complete the peer feedback for your two assigned classmates by the due date.

Quizzes:

- *Check-In Quizzes*

There will be a short, straightforward quiz on Canvas on Monday of each week we do not have an exam. The quiz will be open book and open note, and its purpose is to help you check in on how you are keeping up with the new material.

- *Mastery Quizzes*

There will be three mastery quizzes in this class on the following topics:

- Homomorphisms, Subgroups, and Quotient Groups (**Open September 2 - September 30**)
- The Symmetric Group and Group Actions (**Open September 30-October 28**)
- Rings, Ideals, Quotient Rings, and Ring Homomorphisms (**Open October 28 - November 30**)

The point of a mastery quiz is a straightforward assessment of whether you have a foundational understanding of key concepts in the course; you may attempt each quiz up to five times (the exact questions will vary) during the stated time period. Your quiz grade will be either that you meet the standard of a basic understanding of the assessed concept (80% of questions correct) or that you do not meet the standard yet and should attempt the quiz again after studying. If you have attempted the quiz five times and not met the completion standard, you may set up an oral mastery quiz with the instructor.

Exams: There will be two **in-class** midterm exams during the semester. They will take place on **Wednesday, September 21** and on **Wednesday, October 26**. There will be a review for each exam during class the previous lecture day.

Final exam: The final exam is currently scheduled for December 14th from 11:20am-2:10pm. The final exam matrix for Fall 2022 is available online.

All exams are closed book, closed note, and taken in class. If you have accommodations through ODS, please contact me with documentation during the first week of class. Make-up exams will be allowed only in the case of a documented medical or personal emergency. If an exam conflicts with a holiday you observe, please let me know before the end of the first week of classes.

CIOS: If 85% of students complete the CIOS survey, I will drop an additional homework grade.

Attendance:

- You are responsible for all material covered in class and are encouraged to attend every class ready to participate to get the most out of this course.
- Please show courtesy to your fellow classmates and instructor by adhering to the following class rules:
 - Please be respectful and on topic during class time; disruptive, harassing, and abusive behavior will result in being asked to leave the classroom.
 - Please feel free to ask questions throughout class, however, if you are answering a question please raise your hand and wait for the instructor to call on you.
 - If you experience harassing or abusive behavior from another class member, please let the instructor know as soon as possible.

Academic Dishonesty:

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit <http://www.catalog.gatech.edu/policies/honor-code/> or <http://www.catalog.gatech.edu/rules/18/>. All students must be aware of their individual responsibilities under the Georgia Tech Academic Honor Code, which will be strictly adhered to in this class. Any evidence of cheating or other violations of the Georgia Tech Honor Code (e.g. using other people's work on homework without giving proper credit) will be submitted to the Dean of Students.

Accommodations:

If you are a student with learning needs that require accommodations, contact the Office of Disability Services at (404)894-2563 or <http://disabilityservices.gatech.edu/>, as soon as possible to make an appointment to discuss your needs and to obtain an accommodations letter. Please also

e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Make-Up Exams:

In the event of an absence due to an institute sponsored event, such as an intercollegiate sports competition, please notify me at least two weeks in advance to arrange an early test or other alternative. If you miss an exam due to family or medical emergency, please bring me a note from the Office of the Dean of Students.

Regrade Requests: Any regrading request should be submitted to me through Gradescope within one week of the date the assessment has been returned to the class.

Student-Faculty Expectations Agreement: At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgment, and responsibility between faculty members and the student body. See <http://www.catalog.gatech.edu/rules/22/> for an articulation of some of the basic expectations we have for each other.

As a member of the Georgia Tech community, I am committed to creating a learning environment in which all of my students feel safe and included. Because we are individuals with varying needs, I am reliant on your feedback to achieve this goal. To that end, I invite you to enter into dialogue with me about the things I can stop, start, and continue doing to make my classroom an environment in which every student feels valued and can engage actively in our learning community.

Campus Resources for Students

In your time at Georgia Tech, you may find yourself in need of support. Below you will find some resources to support you both as a student and as a person.

Academic Support

- Center for Academic Success <http://success.gatech.edu>
 - 1-to-1 tutoring <http://success.gatech.edu/1-1-tutoring>
 - Peer-Led Undergraduate Study (PLUS) <http://success.gatech.edu/tutoring/plus>
 - Academic coaching <http://success.gatech.edu/coaching>
- Residence Life's Learning Assistance Program <https://housing.gatech.edu/learning-assistance-program>
- OMED: Educational Services (<http://omed.gatech.edu/programs/academic-support>)
 - Group study sessions and tutoring programs
- Communication Center (<http://www.communicationcenter.gatech.edu>)
 - Individualized help with writing and multimedia projects
- Academic advisors for your major

Personal Support

- The Office of the Dean of Students: <http://studentlife.gatech.edu/content/services>; 404-894-6367; Smithgall Student Services Building 2nd floor
 - You also may request assistance at https://gatech-advocate.symplicity.com/care_report/index.php/pid383662?
- Counseling Center: <http://counseling.gatech.edu>; 404-894-2575; Smithgall Student Services Building 2nd floor
 - Services include short-term individual counseling, group counseling, couples counseling, testing and assessment, referral services, and crisis intervention. Their website also includes links to state and national resources.
 - Students in crisis may walk in during business hours (8am-5pm, Monday through Friday) or contact the counselor on call after hours at 404-894-2204.
- Students' Temporary Assistance and Resources (STAR): <http://studentlife.gatech.edu/content/need-help>
 - Can assist with interview clothing, food, and housing needs.
- Stamps Health Services: <https://health.gatech.edu>; 404-894-1420
 - Primary care, pharmacy, gender-inclusive health care, psychiatry, immunization and allergy, health promotion, and nutrition
- OMED: Educational Services: <http://www.omed.gatech.edu>
- Women's Resource Center: <http://www.womenscenter.gatech.edu>; 404-385-0230
- LGBTQIA Resource Center: <http://lgbtqia.gatech.edu/>; 404-385-2679
- Veteran's Resource Center: <http://veterans.gatech.edu/>; 404-385-2067
- Georgia Tech Police: 404-894-2500

Important Dates

August 22	First Day of Classes
September 21	Midterm 1
October 17	Midsemester Break Day
October 26	Midterm 2
October 29	Withdrawal Deadline
November 23, 25	Fall Break
December 5	Last Day of Class
December 14	Final Exam 11:20am-2:10pm

**This syllabus provides a general plan for the course;
deviations may be necessary.**