POINT 19 02 LOMA
NAZARENE UNIVERSITY

Mathematics, Information, and Computer Sciences – School of STEM

MTH4044 – Abstract Algebra

Fall 2026

4 units

Monday, Wednesday, Friday 12:15-1:20

Rohr Science (RS) 365

Final Exam: Monday, December 14th, 10:30am-1:00pm

Instructor information:	Dr. Elizabeth Holmen-Crow, Assistant Professor of Mathematics
Phone:	619-849-2634
Email:	Dr. Holmen-Crow: ecrow@pointloma.edu
Office hours:	Location: Rohr Science 234 (through RS 230) or Zoom Times posted in Canvas

PLNU Mission:

To Teach ~ To Shape ~ To Send

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Department Mission: The Mathematical, Information, and Computer Sciences department at Point Loma Nazarene University is committed to maintaining a curriculum that provides its students with the tools to be productive, the passion to continue learning, and Christian perspectives to provide a basis for making sound value judgments.

Course Description: A study of groups, rings, fields and related structures with selected applications.

Corequisite(s): MTH 2033 and MTH 3012 and Junior standing

Program and Course Learning Outcomes:

1. Students will be able to write proofs.
2. Students will be able to demonstrate facility with algebraic structures.
3. Students will be able to speak about their work with precision, clarity and organization.
4. Students will be able to write about their work with precision, clarity and organization.
5. Students will collaborate effectively in teams.
6. Students will be able to understand and create arguments supported by quantitative evidence, and they can clearly communicate those arguments in a variety of formats.

Required Texts and Recommended Study Resources:

A First Course in Abstract Algebra, 7th edition, by John B. Fraleigh (ISBN: 9780201763904)

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Assessment and Grading

The graded components are written homework, quizzes, midterm exams, and the final examination.

Homework: Homework will be assigned every class meeting. All homework assigned in a week will be due at the beginning of Wednesday's class of the following week. No late homework will be accepted except by prior (meaning more than 24 hours before) arrangement (with me) or with a documented emergency.

Comments on homework:

- This is the minimum amount of homework that is required but you may need to do several odd numbered problems to make sure you get the answer in the textbook.
- Please be sure that your homework is stapled together, and the problems are in order.
- **Homework will be scored on a combination of completeness and correctness. All work necessary to complete a problem must be shown to earn credit.**
- Start working on your homework early. These problems are difficult and meant to be done a little at a time over the course of a few days.
- When doing homework, please note it is normal to not be able to do every problem correct on the first attempt. Do not be discouraged, instead seek help.
- The two lowest homework scores will be dropped before calculating the overall grade for homework.

Quizzes

There's a fair amount of evidence that regular quizzing (hence recall) is beneficial for the learning of new material. Abstract Algebra has familiar concepts in an unfamiliar setting. There is a lot of vocabulary, definitions and knowledge of counterexamples that are needed to make progress in this course. The quizzes will focus on these areas. Quiz content will be announced in class ahead of time. This is an opportunity for informal assessment of your progress in the course.

Examinations and the Final Examination

There are three exams and one final exam. The exams will include problems and questions over material assigned in the text, readings, and handouts, as well as material presented in class. If you do not take an exam, you will receive a zero for it. Late exams may be taken only by prior arrangement with me or a well-documented emergency beyond your control. The examination schedule is included in the daily schedule. Please note I do not intend to accept excuses for missed exams, please notify me immediately if you have a conflict.

Grading Scale

A passing grade requires getting at least 60% in one of the two tests or on the final exam. Grades are based on the number of points accumulated throughout the course. Approximate minimal percentages required to obtain a given grade are:

Grading Scale in Percentages				
	A	B	C	D
+		(87.5, 90]	(77.5, 80]	(67.5, 70]
	(92.5, 100]	(82.5, 87.5]	(72.5, 77.5]	(62.5, 67.5]
−	(90, 92.5]	(80, 82.5]	(70, 72.5]	[60, 62.5]

Grading Distribution

Grade Distribution	
Three Exams scored at 15% each	45%
Final Exam (Cumulative)	25%
Quizzes	10%
Homework	20%
Total	100%

Final Examination Policy

Successful completion of this class requires taking the final examination on its scheduled day. The final examination schedule is posted on the Traditional Undergraduate Records: Final Exam Schedules site. If you find yourself scheduled for three (3) or more final examinations on the same day, you are authorized to contact each professor to arrange a different time for one of those exams. However, unless you have three (3) or more exams on the same day, no requests for alternative final examinations will be granted.

Incomplete and Late Assignments

- All assignments are to be submitted/turned in by the beginning of the class session when they are due—including assignments posted in Canvas. Late work need not be accepted. Make-up tests will be given only by prior arrangement with the instructor for reasons of documented emergency.
- **Incomplete grade:** Incompletes will only be assigned in extremely unusual circumstances. You may request a grade of I (incomplete) only if you are having a passing grade and at least 70% of the course work is completed.

Artificial Intelligence (AI) Policy

The use of Artificial Intelligence (AI) tools (e.g., ChatGPT, Gemini Pro 1.5, Grammarly Go, Perplexity, etc.) is **prohibited** in this course for any aspect of your work, including idea generation, drafting, editing, or final submissions. This course is designed to assess your independent critical thinking, writing, and research skills without the assistance of AI technologies. Violations of this policy will be treated as breaches of academic integrity.

PLNU Academic Accommodations Policy

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities in accordance with the Americans with Disabilities Act (ADA). Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center, by email or phone at 619-849-2533. Once a student's eligibility for an accommodation has been determined, the EAC will work with the student to create an Accommodation Plan (AP) that outlines approved accommodations. Professors are able to view a student's approved accommodations through Accommodate.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their approved accommodations in that particular course. Accommodations are not retroactive; as such, clarifying with the professor at the outset is one of the best ways to promote positive academic outcomes.

Students who need accommodations for a disability-related need should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. In accordance with ADA, accommodations cannot constitute a fundamental alteration to course outcomes; therefore, planning ahead is vital in establishing appropriate accommodations for equal access to this course. It is the student's responsibility to make the first contact with the EAC. Students cannot assume that because they had accommodations in the past, their eligibility at PLNU is automatic. All determinations at PLNU must go through the EAC eligibility process. This is to protect the privacy of students with disabilities who may not want to disclose this information and are not asking for any accommodations.

PLNU Attendance and Participation Policy: Regular and punctual attendance at all class sessions is considered essential to optimum academic achievement. If the student is absent for more than 10 percent of class sessions, the faculty member will issue a written warning of de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university withdrawal date or, after that date, receive an "F" grade.

LomaBooks Instructions for Students: This course is part of our course material delivery program, LomaBooks. The bookstore will provide each student with a convenient package containing all required physical materials; all digitally delivered materials will be integrated into Canvas.

You should have received an email from the bookstore confirming the list of materials that will be provided for each of your courses and asking you to select how you would like to receive any printed components (in-store pick up or home delivery). If you have not done so already, please confirm your fulfillment preference so the bookstore can prepare your LomaBooks materials.

Additional Course Information:

Additional PLNU policies and practices that apply to this course can be found at the following link:

https://docs.google.com/document/d/1SoL5YMfCv_5cobhBwrDjbcZJzNKKTCfM/edit?usp=sharing&ouid=104297418648613020764&rtpof=true&sd=true

Daily Schedule

Week	Monday	Wednesday	Friday
1	8/31 Sec. 0: Sets & Relations Sec. 1: Introduction & Examples	9/2 Sec. 2: Binary Operations	9/4 No class. Read Section 3.
2	9/7 Labor Day No class	9/9 Sec. 3: Isomorphic Structures Homework #1	9/11 Sec. 4: Groups Quiz #1
3	9/14 Sec. 5: Subgroups	9/16 Sec. 6: Cyclic Groups Homework #2	9/18 Sec. 7: Generating Sets Quiz #2
4	9/21 Review for Exam #1	9/23 Exam #1 Homework #3	9/25 Sec. 8: Groups of Permutations
5	9/28 Sec. 9: Orbits, Cycles, and Alternating Groups	9/30 Sec. 10: Cosets Homework #4	10/2 Sec. 11: Direct Products and Abelian Groups Quiz #3
6	10/5 Sec. 13: Homomorphisms	10/7 Sec. 13: Homomorphisms Sec. 14: Factor Groups Homework #5	10/9 Sec. 14: Factor Groups Quiz #4
7	10/12 Sec. 15: Factor-Group Computations	10/14 Sec. 15: Factor-Group Comp. Homework #6	10/16 Sec. 18: Rings and Fields Quiz #5
8	10/19 Review for Exam #2	10/21 Exam #2 Homework #7	10/23 No class Fall Break
9	10/26 Sec. 18: Rings and Fields Sec. 19: Integral Domains	10/28 Sec. 20: Fermat and Euler	10/30 Sec. 20: Fermat and Euler Quiz #6
10	11/2 Sec. 21: Fields of Quotients of an Integral Domain	11/4 Sec. 21: Fields of Quotients Sec. 22: Rings of Polynomials Homework #8	11/6 Sec. 22: Rings of Polynomials Quiz #7
11	11/9 Sec. 23: Factorization of Polynomials over a Field	11/11 Sec. 23: Factorization of Polynomials over a Field Homework #9	11/13 Sec. 26: Homomorphisms and Factor Rings Quiz #8
12	11/16 Review for Exam #3	11/18 Exam #3 Homework #10	11/20 Sec. 27: Prime and Maximal Ideals
13	11/23 Sec. 27: Prime and Maximal Ideals	11/25 No class Thanksgiving	11/27 No class Thanksgiving
14	11/30 Sec. 29: Extension Fields	12/2 Sec. 29: Extension Fields Sec. 30: Vector Spaces	12/4 Sec. 31: Algebraic Extensions Quiz #9
15	12/7 Sec. 31: Algebraic Extensions Sec. 33: Finite Fields	12/9 Sec. 33: Finite Fields Homework #11	12/11 Review for Final Exam
Finals	12/14 Final 10:30 – 1:00	12/16	12/18