Syllabus

	Department of Mathematical, Information and Computer Sciences
	MTH 4044—Abstract Algebra
	4 Units MWF 8:30-9:35, Rohr Science 395
Fall 2022 | August 30 - December 16	

Instructor: Greg Crow
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Office hours: 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.
Corequisites: MTH 2033 and MTH 3012 and Junior Standing

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.

COURSE PHILOSOPHY

Mathematics requires active participation. Participation means asking questions, making conjectures and checking them, providing solutions to problems, sharing ideas with classmates. During class time I will participate in the same way.

REQUIRED TEXTS AND RECOMMENDED STUDY RESOURCES

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

ASSESSMENT AND GRADING

Graded Components

Homework: Homework problems will be assigned regularly and posted on Canvas. A homework assignment is late if it is not submitted at the beginning of class on the due date. Please check regularly to ensure that you are keeping up with the homework. Late homework will not be accepted without prior approval. Your lowest homework score will be dropped.

Examinations and the Final Examination. Examinations and the Final Examination will include problems and questions over material assigned in the text, readings and handouts, as well as material presented in class. No examination shall be missed without prior consent or a well-documented emergency beyond your control. A score of zero will be assigned for an examination that is missed without prior consent or a well-documented emergency beyond your control.

Late Written Homework will not be accepted without prior consent or a well-documented emergency. Up to a maximum of one homework assignment will be accepted up to 3 days late provided that consent is received from the professor before it is due. Homework assignments that are submitted late without prior consent will be recorded with a score of zero. If more than half of the

homework assignments are submitted on time, then the lowest homework score will be dropped from the calculations of the homework grade. The examination schedule is included in the daily schedule. This instructor does not intend to accept excuses such as poor communication with parents, benefactors, surf team sponsors and/or travel agents.

Grading Distribution	Percent
Three Examinations (at 15% Each)	45
Final Exam	25
Written Homework	30
Total	**100**

FINAL EXAM:

Date and Time: Monday, 12-Dec-2022 7:30-10:00am

The final exam date and time is set by the university at the beginning of the semester and may not be changed by the instructor. This schedule can be found on the university website and in the course calendar. No requests for early examinations will be approved. Only in the case that a student is required to take three exams during the same day of finals week, is an instructor authorized to consider changing the exam date and time for that particular student.

Grading Scale

Grades are based on the number of points accumulated throughout the course with the following exception. A student must pass at least one of Examination 1, Examination 2, Examination 3, or the Final Examination in order to pass the class. That is, a score of 60% must be achieved on one of the Examinations, or else the final grade will be an F regardless of all other point totals. Approximate minimal percentages required to obtain a given grade are:

Standard Grade Scale Based on Percentages					
	A	**B**	**C**	**D**	**F**
+		(87.5- 90.0)	(77.5-80.0)	(67.5-70.0)	
	[92.5 -100.0]	[82.5-87.5]	[72.5-77.5]	[62.5 -67.5]	[0-60)
_	[90.0-92.5)	[80.0-82.5)	[70.0-72.5)	[60.0-62.5)	

STATE AUTHORIZATION

State authorization is a formal determination by a state that Point Loma Nazarene University is approved to conduct activities regulated by that state. In certain states outside California, Point Loma Nazarene University is not authorized to enroll online (distance education) students. If a student moves to another state after admission to the program and/or enrollment in an online course, continuation within the program and/or course will depend on whether Point Loma Nazarene University is authorized to offer distance education courses in that state. It is the student's responsibility to notify the institution of any change in his or her physical location. Refer to the map on **State Authorization** (https://www.pointloma.edu/offices/office-institutional-effectiveness-research/disclosures) to view which states allow online (distance education) outside of California.

INCOMPLETES 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. Incompletes will only be assigned in extremely unusual circumstances.

CLASS ENROLLMENT

It is the student's responsibility to maintain his/her class schedule. Should the need arise to drop this course (personal emergencies, poor performance, etc.), the student has the responsibility to follow through (provided the drop date meets the stated calendar deadline established by the university), not the instructor. Simply ceasing to attend this course or failing to follow through to arrange for a change of registration (drop/add) may easily result in a grade of F on the official transcript.

COURSE CREDIT HOUR INFORMATION

In the interest of providing sufficient time to accomplish the stated Course Learning Outcomes, this class meets the PLNU credit hour policy for a 4-unit class delivered over fifteen weeks. Specific details about how the class meets the credit hour requirement can be provided upon request. (Based on 37.5 hours of student engagement per credit hour.)

PLNU COPYRIGHT POLICY

Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

PLNU ACADEMIC HONESTY POLICY

Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See **Academic Policies** (http://catalog.pointloma.edu/content.php?catoid=18&navoid=1278) for definitions of kinds of academic dishonesty and for further policy information.

PLNU ACADEMIC ACCOMMODATIONS POLICY

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities. Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center (**EAC@pointloma.edu** **(mailto:EAC@pointloma.edu)** or 619-849-2486). Once a student's eligibility for an accommodation has been determined, the EAC will issue an academic accommodation plan ("AP") to all faculty who teach courses in which the student is enrolled each semester.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course and/or if they do not wish to utilize some or all of the elements of their AP in that course. Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student's responsibility to make the first contact with the EAC.

PLNU ATTENDANCE AND PARTICIPATION POLICY

Attendance is expected at each class session. In the event of an absence, you are responsible for the material covered in class and the assignments given that day.

Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See **Academic Policies** **(http://catalog.pointloma.edu/content.php? catoid=18&navoid=1278#Class_Attendance)** for further information about class attendance.

SPIRITUAL CARE

Please be aware PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith. If students have questions, a desire to meet with the chaplain or have prayer requests you can contact the **Office of Spiritual Development** **(https://www.pointloma.edu/offices/spiritual-development)**

	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
Aug	28	On Tuesday the 30th (Monday Schedule) Sec 0: Sets and Relations Sec 1: Introduction and Examples	30	31 Sec 1: Introduction and Examples Sec 2: Binary Operations	1	2 Sec 2: Binary Operations Sec 3: Isomorphic Binary Structures	3
September	4	5 **Labor Day**	6	7 Sec 4: Groups	8	9 Sec 5: Subgroups	10
	11	12 Sec 6: Cyclic groups	13	14 Sec 6: Cyclic groups Sec 7: Generating Sets and Cayley Digraphs	15	16 Department Chapel Sec 8: Groups of Permutations	17
	18	19 Review for Exam #1	20	21 **Exam 1**	22	23 Sec 8: Groups of Permutations Sec 9: Orbits, Cycles, and the Alternating Groups	24
	25	26 Sec 9: Orbits, Cycles, and the Alternating Groups Sec 10: Cosets and the Theorem of Lagrange	27	28 Sec 10: Cosets and the Theorem of Lagrange Sec 11: Direct Products & Finitely Gen. Abelian Groups	29	30 Sec 11: Direct Products & Finitely Generated Abelian Groups	1
October	2	3 Sec 13: Homomorphisms	4	5 Sec 13: Homomorphisms Sec 14: Factor Groups	6	7 Sec 14: Factor Groups	8
	9	10 Sec 15: Factor-Group Computations and Simple Groups	11	12 Sec 15: Factor-Group Computations and Simple Groups	13	14 Advising Day Chapel Sec 18: Rings and Fields	15
	16	17 Review for Exam #2	18	19 **Exam 2**	20	21 Fall Break	22
	23	24 **Spiritual Renewal Week** Sec 18: Rings and Fields Sec 19: Integral Domains	25	26 **Spiritual Renewal Week** Sec 19: Integral Domains Sec 20: Fermat's and Euler's Theorems	27	28 **Spiritual Renewal Week** Sec 20: Fermat's and Euler's Theorems	29
	30	31 Sec 21: The Field of Quotients of an Integral Domain	1	2 Sec 21: The Field of Quotients of an Integral Domain Sec 22: Rings of Polynomials	3	4 Sec 22: Rings of Polynomials	5
November	6	7 Sec 23: Factorization of Polynomials over a Field	8	9 Sec 23: Factorization of Polynomials over a Field	10	11 Sec 26: Homomorphisms and Factor Rings	12
	13	14 Sec 27: Prime and Maximal Ideals	15	16 Sec 27: Prime and Maximal Ideals	17	18 Review for Exam #3	19
	20	21 **Exam 3**	22	23 Thanksgiving Recess	24	25	26
	27	28 Sec 29: Introduction to Extension Fields	29	30 Sec 29: Introduction to Extension Fields Sec 30: Vector Spaces	1	2 Sec 30: Vector Spaces Sec 31: Algebraic Extensions	3
December	4	5 Sec 31: Algebraic Extensions Sec 33: Finite Fields	6	7 Sec 33: Finite Fields	8	9 Review for Final Exam	10
	11	12 **Final Exam** 7:30 AM	13	14	15	16	17