POINT 1902 LOMA
NAZARENE UNIVERSITY

Mathematics, Information, and Computer Sciences – School of STEM

MTH4002 – Topics in Topology

2 units

Fall 2026

Rohr Science 395, TR 8:30-9:35am

Final Presentations: RS395 on Tuesday, December 15th from 10:30 am – 1:00 pm

Instructor: Dr. Greg Crow, Professor of Mathematics
Phone: 619-849-2604
Email: gcrow@pointloma.edu
Office hours: Location: Rohr Science 252 (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:

MTH 4002 – Topics in Geometry

A study of the foundations of geometry, Affine, non-Euclidean and projective geometries. A synthetic development of advanced Euclidean geometry including geometric transformations, convexity, and constructions.

Prerequisite: MTH 1044 or MTH 1064

PROGRAM AND COURSE LEARNING OUTCOMES

1. Students will be able to demonstrate facility with analytical concepts.
2. Students will be able to write proofs.
3. Students will be able to apply their mathematical knowledge to solve problems.

REQUIRED TEXTS AND RECOMMENDED STUDY RESOURCES

Students are responsible for having the required course textbooks prior to the first day of class.

Textbooks:

Taxicab Geometry: An Adventure in Non-Euclidean Geometry, by Eugene F. Krause 9780486252025
Exploring Advanced Euclidean Geometry with GeoGebra by Gerard A. Venema 9780883857847

Other materials: A Laptop or access to a computer

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.

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 2-unit class delivered over 15 weeks. It is anticipated that students will spend a minimum of 37.5 participation hours per credit hour on their coursework. For this course, students will spend an estimated 75 total hours meeting the course learning outcomes.

ASSESSMENT AND GRADING

The grade components are written homework, labs, midterm exams, and the final examination. The grading distribution can be found below.

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 the Midterm Exam 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:

Grading Scale in Percentages				
	A	B	C	D
+		(87.5, 90.0]	(77.5, 80.0]	(67.5, 70.0]
	(92.5, 100]	(82.5, 87.5]	(72.5, 77.5]	(62.5, 67.5]
−	(90.0, 92.5]	(80.0, 82.5]	(70.0, 72.5]	[60.0, 62.5]

GRADING DISTRIBUTION

Grade Distribution	
Midterm Exam	20%
Final Exam and Final Presentation	35%
First Portfolio	15%
Second Portfolio	30%
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.

Graded Components

- **Homework:** The homework is designed to allow you to master the concepts of Geometry; it is not an end in itself. Assignments will be announced on Tuesday and Thursday. The work will be submitted as two portfolios. The first portfolio containing the Taxi-Cab problems will be submitted on or before Tuesday 20-Oct-2026. The second portfolio containing the problems from Euclidean Geometry will submitted on or before Tuesday 15-Dec-2026. The penalty for late work on each of the portfolio submissions will be a $2^{n-1} \cdot 10\%$ deduction where n = the number of weekdays late. The day counter for late work begins at the start of class on the weekday it is due. For example, a portfolio submitted at 12:30pm on the Thursday after the due date will incur a two day late penalty deduction of 20%.
- **Midterm Examination and the Final Examination:** The Midterm Examination 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. 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.

COMMENTS ON HOMEWORK

- 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 correctly on the first attempt. Do not be discouraged, instead seek help.

INCOMPLETE AND LATE ASSIGNMENTS

- All assignments are to be submitted/turned in by the due date and time, including assignments posted in Canvas. We understand that life happens, if you contact your instructor prior to the due date of the assignment you may request one extension as indicated above. **Late work need not be accepted.**
- Make-up tests will be given only by prior arrangement with the instructor for reasons of documented emergency. All Make-up tests will be offered on the Saturday between classes and Final Exams at 8:30 AM.
- **Incomplete grade:** Incompletes will only be assigned in extremely unusual circumstances. You may request a grade of I (incomplete) only if you have a passing grade and at least 70% of the course work is completed.

ARTIFICIAL INTELLIGENCE POLICY

You are allowed to use Artificial Intelligence (AI) tools (e.g., ChatGPT, Gemini Pro, Grammarly Go, Perplexity, etc.) to generate ideas, but you are not allowed to use AI tools to generate content (text, video, audio, images) that will end up in any work submitted to be graded for this course. If you have any doubts about using AI, please gain permission from the instructor.

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.

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.

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

Fall 2026 Calendar MTH 4002

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Aug	30	31	1 Introduction to a Non-Euclidean Geometry	2	3 Taxicab Geometry Chapter 1	4	5
September	6	7 **Labor Day**	8 Taxicab Geometry Chapter 2	9	10 Taxicab Geometry Chapter 2	11	12
	13	14	15 Taxicab Geometry Chapter 4	16	17 Taxicab Geometry Chapter 4	18	19
	20	21	22 Taxicab Geometry Chapter 6	23	24 Taxicab Geometry Chapter 6	25	26
	27	28	29 Introduction to GeoGebra Venema: Section 1.2	30	1 Venema: Section 1.3	2	3
October	4	5	6 Venema: Section 1.4	7	8 Venema: Section 2.2	9	10
	11	12	13 Venema: Section 2.3	14	15 Venema: Section 2.4	16	17
	18	19	20 Due: First Portfolio Midterm Exam	21	22 **Fall Break**	23	24
	25	26	27 Venema: Section 2.5	28	29 Venema: Section 4.1	30	31
November	1	2 **Spiritual Renewal**	3 Venema: Section 4.2	4 **Spiritual Renewal**	5 Venema: Section 4.3	6 **Spiritual Renewal**	7
	8	9	10 Venema: Section 5.1	11	12 Venema: Section 5.2	13	14
	15	16	17 Venema: Section 5.3	18	19 Venema: Section 7.1 & 7.2	20	21
	22	23	24 Venema: Section 7.3	25	26 **Thanksgiving Recess**	27	28
	29	30	1 Paths in R^2	2	3 Equivalence of Paths in R^2	4	5
December	6	7	8 Products of Paths in R^2 Loops in R^2	9	10 Obstructions in R^2	11	12
	13	14	15 *Due: Second Portfolio* 10:30 AM – 1:00 PM **Final Exam**	16	17	18	19