POINT 19 02 LOMA
NAZARENE UNIVERSITY

Mathematics, Information, and Computer Sciences – School of STEM

MTH3003 – Problem Solving

Sections 4 and 5, Spring 2026

3 units

Liberty Station, Room 202

Final Exam: Main Hall Liberty Station on Wednesday, December 16th, 1:30-4:00pm

Section information:	Section 4 meets Tuesday and Thursday, 1:00 pm – 2:15 pm Section 5 meets Tuesday and Thursday, 2:30 pm – 3:45 pm
Instructor information:	Dr. Elizabeth Holmen-Crow, Assistant Professor of Mathematics
Phone:	619-849-2634
Email:	eholmencrow@pointloma.edu
Office hours:	Location: Rohr Science 234 (through RS 230) 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.

General Education:

PLNU provides a foundational course of study in the liberal arts informed by the life, death, and resurrection of Jesus Christ. In keeping with the Wesleyan tradition, the curriculum equips students with a broad range of knowledge and skills within and across disciplines to enrich major study, lifelong learning, and vocational service as Christ-like participants in the world's diverse societies and culture.

Course Description

A general education course whose major goal is to develop the ability to solve non-routine problems through dynamic processes of inquiry and exploration, logical reasoning, making and testing conjectures and investigating implications of conclusions. A study of quantitative reasoning with emphasis on active problem solving and developing connections with other disciplines. Not applicable toward a major in Mathematics.

Program and Course Learning Outcomes

- Students will be able to formulate a mathematical model from a verbal description of a problem.
- Students will be able to solve non-routine problems using logic and quantitative techniques.
- Students will be able to construct solutions to problems using computational techniques

General Education Learning Outcomes

- Link to GE courses and corresponding GELO's: https://assessment.pointloma.edu/academicassessment/general-education/assessment-plan/
- *GELO 1e: Students will be able to solve problems that are quantitative in nature.*
- *Signature Assignment: Questions on the Final Exam and the Group Project*

Required Texts and Recommended Study Resources

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

All supplemental materials posted on this course site (including articles, book excerpts, or other documents) are provided for your personal academic use. These materials may be protected by copyright law and should not be duplicated or distributed without permission of the copyright owner.

- **Textbook:** Excursion in Modern Mathematics, 10th Edition (Electronic Copy via Access Pearson) **Author:** Peter Tannenbaum, **Publisher:** PEARSON
- A scientific calculator is required.
- A calculator (TI-30XIIS) will be provided for you to use on exams. You may not use your own calculator on exams.
- Laptop or access to a computer with Java enabled in the web browser
- Excel (see Canvas for download and installation instructions)

Assessment and Grading

The grade components are written homework, online homework, projects, class activities, 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 Examination 1, Examination 2, 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
A [92.5-100]	B+ [87.5-90)	C+ [77.5-80)	D+ [67.5-70)	F [0-60)
A- [90-92.5)	B [82.5-87.5)	C [72.5-77.5)	D [62.5-67.5)	
	B- [80-82.5)	C- [70-72.5)	D- [60-62.5)	

Grading distribution:

Grade Distribution

Two Midterms Exams	35%
Final Exam (Cumulative)	25%
Online Assignments (OA)	10%
Group Project	5%
Individual Budget Assignment	5%
Written Homework	13%
Class Activities	7%
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.

Other Factors That Affect Grades

- **Online Assignments:** Online assignments (OA) will be completed in Access Pearson and Mastering website. This will be available by purchasing an access code (this should be included with your e-textbook).
- **Written Homework:** Assignments collected must be prepared in a style suitable for grading. The following guidelines are used to determine credit:
    - Work all the assigned problems by hand with pencil and paper (or stylus and tablet).
    - The organization must be easy to follow.
    - The work must be legible.
    - Complete solutions must be written for problems (not just answers); answers must be clearly marked.
    - Use complete sentences to answer questions.

- **Tests and Final Examination:** Tests and the final exam will include problems and questions over material assigned in the text, readings, handouts, and 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.

Incompletes and Late Assignments

- All assignments are to be submitted/turned in by the due date and time —including assignments posted in Canvas. **Late work need not be accepted.**
- Written homework is **due on Gradescope on Saturdays by 11:59pm**. **All homework assignments must use the templated PDF given in Canvas** or students risk losing points.
- Make-up tests will be given only by prior arrangement with the instructor for reasons of documented emergency. All make-up tests will be given in Rohr Science 295 at 8:30am on Saturday, December 12^{th}.
- **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. Incompletes will only be assigned in extremely unusual circumstances.

Comments On Homework

1. 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.
2. Work all the assigned problems by hand with pencil and paper (or tablet). Make sure to show all your work! This is good practice for the exams and I can only give partial credit to whatever work I see on the page. Once you are finished, you may turn in your paper homework as indicated in the Canvas assignment.
3. Homework will be scored on a combination of completeness and correctness. All work necessary to complete a problem must be shown to earn credit.
4. 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.
5. 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.

Artificial Intelligence (AI) Policy

The use of Artificial Intelligence (AI) tools (e.g., ChatGPT, Gemini Pro, GrammarlyGo, Perplexity, etc.) is prohibited in the 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. Any reliance on AI tools in this course is subjective to academic honesty violation.

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

Course Philosophy

The general method of the course is to involve students in "dynamic processes of inquiry and exploration, logical reasoning, making and testing conjectures, and investigating implications of

conclusions" [Catalog]. Specifically, the focus is on the processes and tools of quantitative problem solving. Learning what they are and developing ability to use them.

- "Today's world is more mathematical than yesterday's, and tomorrow's world will be more mathematical than today's." "...mathematics...serves as a key to opportunity and careers."[Everybody Counts, p.45, p.3]
- "To participate rationally in a world where discussions about everything from finance to the environment, from personal health to politics, are increasingly informed by mathematics, one must understand mathematical methods and concepts, their assumptions and implications." [50 Hours, p.35]

In view of these statements and many other similar ones from national reports, this quantitative experience (MTH 3003) has been included as part of the PLNU general education curriculum. Thus, all students will study "major concepts, methods, and applications of quantitative reasoning with emphases on active problem solving" [Catalog].

Course Approach

The ability to solve problems requires resourcefulness, flexibility, and efficiency in dealing with new obstacles. Research on teaching and learning problem solving suggests that certain factors are critical to successful problem solving, including resources, heuristics, control, and belief systems [Schoenfeld, 1985].

- **Resources** refer to whatever information problem solvers understand (or misunderstand) that might be brought to bear on a problem.
- **Heuristic** refers to strategies and techniques problem solvers have (or lack) for making progress when working on non-routine problems.
- **Control** refers to the way problem solvers use (or fail to use) the information at their disposal.
- **Belief systems** refer to the problem solver's "world view" of the problem domain, which determines the ways they use the knowledge in the first three categories.

The approach in MTH 3003 develops and uses these factors to increase your problem-solving ability. Classroom techniques used include:

- the teacher as role model
- whole-class problem solving with teacher as control
- small-group problem solving with teacher as coach

In addition, you are assigned readings and problems that will help you identify and make progress in the four areas discussed above.

Course Methods

Use of groups: There is almost a century of research showing that academic achievement, productivity, and self-esteem improve dramatically when students work together in groups. This method emphasizes teamwork, cooperation and support by others, rather than isolation and competition in learning.

Role of the classroom instructor: There will be less direct "lecturing" in class than usual, with many questions "answered" by another question to help you work through your own questions and difficulties. You are expected to learn problem solving through active involvement - reading, writing, and explaining to others what you are thinking and doing.

This may require some adjustment in the way you think about teaching and learning. Initially, you may wish for more direct information and answers, but your patience and effort will be rewarded with a deeper understanding and increasing independence in problem solving, as well as confidence in your ability to tackle new problems.

References

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Date	Tuesday	Date	Thursday	Due Soon
9/1/2026	**Lecture:** Course Intro & Ch.1 Intro to Voting Systems	9/3/2026	**Lecture:** Chapter 1 Alternative Voting Methods	Obtain Materials Register MyLab, Intro Quiz
9/8/2026	**Lecture:** Chapter 1 Fairness of Voting Methods	9/10/2026	**Lecture:** Chapter 2 Intro to Weighted Voting	Online Activity (OA) 1.1-1.5 Class Activity (CA) Ch1
9/15/2026	**Lecture:** Chapter 2 Banzhaf Power Distribution	9/17/2026	**Lecture:** Chapter 2 Shapley Shubik Power	OA 1.6-2.2 Written HW (WHW) Ch1
9/22/2026	**Lecture:** Chapter 4 Intro to Apportionment	9/24/2026	**Lecture:** Chapter 4 Modified Divisor Methods	CA Ch2, OA 2.3-4.2 WHW Ch2
9/29/2026	**Lecture:** Chapter 4 Apportionment and Fairness	10/1/2026	**Lecture:** Ch5 Intro to Graph Theory	OA 4.3-4.6 Class Activity Ch4
10/6/2026	**Lecture:** Review Chapters 1, 2, 4	10/8/2026	***Exam #1***	OA 5.1-5.2, Study WHW Ch4
10/13/2026	**Lecture:** Chapter 5 Street Routing Problems	10/15/2026	**Lecture:** Chapter 5 Eulerizing and Solving SRPs	OA 5.3-5.4 Begin Group Project
10/20/2026	**Lecture:** Chapter 6 Traveling Salesman Problems	10/22/2026	*NO CLASS* *Fall Break*	CA Ch5, OA 6.1-6.2 WHW Ch5
10/27/2026	**Lecture:** Chapter 6 Algorithms to Solve TSPs	10/29/2026	**Lecture:** Chapter 6 Algorithms to Solve TSPs	OA 6.3-6.5 CA Ch6
11/3/2026	**Lecture:** Chapter 10 Introduction to Finance	11/5/2026	**Lecture:** Chapter 10 Interest and Retirement	Begin Budget Project WHW Ch6 ☐ OA 10.1-3
11/10/2026	**Lecture:** Chapter 10 Loan Payment, Amortization	11/12/2026	**Lecture:** Chapter 7 Intro Network Problems	OA 10.5 ☐ CA Ch10 Submit Group Project
11/17/2026	**Lecture:** Review Chapters 5, 6, 10	11/19/2026	***Exam #2***	OA 7.1, Study WHW Ch10
11/24/2026	**Lecture:** Chapter 7 Network Problems and Trees	11/26/2026	*NO CLASS* *Thanksgiving Break*	CA7, OA 7.2-7.3 Enjoy Your Vacation
12/1/2026	**Lecture:** Chapter 8 Digraphs and Task Processers	12/3/2026	**Lecture:** Chapter 8 Priority Lists and Scheduling	OA 8.1-8.3 ☐ WHW Ch7 Submit Budget Project
12/8/2026	**Lecture:** Chapter 8 Critical Paths and Backflow	12/10/2026	**Lecture:** Catch Up & Review Voting, Graphs, and Finance	OA 8.4-8.5 ☐ CA Ch8 WHW Ch8 ☐ Study
	No Class: Finals Week	***Final Exam*** Wednesday 12/16 @ 1:30pm-4pm		