Mathematical, Information and Computer Sciences
Shared Syllabus for Problem Solving

<table>
<tr><td colspan="4">Section and Instructor Information</td><td>Online Text</td><td>Table of Contents</td></tr>
<tr><td colspan="4">1)   Jesús Jiménez
RS 218 (849-2634)
jjimenez@pointloma.edu

2)   Jesús Jiménez
RS 218 (849-2634)
jjimenez@pointloma.edu</td><td>Excursions in Mathematics
9th Edition
Peter Tannenbaum
PEARSON
ISBN: 978-0-321-82573-5</td><td>Required Material
Course Content
General Education Statement
Course Philosophy
Learning Outcomes
Course Approach
Grading Policy
Distribution of student's work hours
Attendance Policy
Classroom Attire
Academic Accommodations
Academic Honesty
Final Examination
FERPA Policy
References</td></tr>
</table>

Section, Meeting Days, Time and Room				
1)	MTWR	7:30 – 9:00 am	LA	1
2)	MTWR	4:30 – 6:00 pm	LA	1

Office Hours	
MW	9:30 – 11:30 am and 1:30 – 3:30 pm

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 becomes an expression of faith. Being of Wesleyan heritage, we aspire 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 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.

Course Learning Outcomes
GE Learning Outcome: Students will be able to solve problems that are quantitative in nature:
1. Students will be able to formulate a mathematical model from a verbal description of a problem.
2. Students will be able to solve non-routine problems using logic and quantitative techniques.
3. Students will be able to construct solutions to problems using computational techniques

Required Materials
Calculator: A scientific calculator is required. During examinations, you may not use your cell phone as a calculator.

General Education Statement
This course is one of the components of the General Education Program at Point Loma Nazarene University, under the category of _Developing Cognitive Abilities_. By including this course in a common educational experience for undergraduates, the faculty supports the pursuit of personal awareness and skill development, focusing on the analytical, communicative, and quantitative skills necessary for successful living in society.

Course Credit Hours 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 3-unit class delivered over 5 weeks. Specific details about how the class meets the credit hour is provided below.

Online Quizzes	8.00
Online Homework	8.75
Reading Text	24.00
Watching Videos	8.00
In-Class Meeting	18.75
Written Homework	16.00
Group Project	6.00
Budget Project	4.00
Chapter Post Test Reviews	16.00
Midterms	2.50
Final Exam	2.50
TOTAL	**114.50**

Course Schedule and Assignments

Daily Schedule					Summer 2017
		Date	In Class	Online Readings and Videos	Online HW and Quizzes
1	Monday	8-May	Chapter 1	Chapter 1 reading	Intro to MyMathLab
				Chapter 1 videos	
2	Tuesday	9-May	Chapter 1 and 2	Chapter 2 reading	OA 1
				Chapter 2 videos	
3	Wednesday	10-May	Chapter 2		Quiz 1
			Homework 1		
4	Thursday	11-May	No Class	Chapter 4 reading	OA 2
				Chapter 4 videos	
	Friday	12-May			Quiz 2
					OA 4
5	Monday	15-May	Chapter 4		
			Homework 2		
6	Tuesday	16-May	Chapter 4	Chapter 5 reading	
				Chapter 5 videos	
7	Wednesday	17-May	Chapter 5		Quiz 4
			Homework 4		
8	Thursday	18-May	Exam 1 Chapters 1, 2, 4		
	Friday	19-May			OA 5
9	Monday	22-May	Chapter 5	Chapter 6 reading	Quiz 5
			Group Project	Chapter 6 videos	
10	Tuesday	23-May	Chapter 6	Chapter 7 reading	OA 6
			Homework 5	Chapter 7 videos	
11	Wednesday	24-May	Chapter 7		Quiz 6
			Homework 6		
12	Thursday	25-May	No Class		OA 7
	Friday	26-May			Quiz 7
13	Monday	29-May	Memorial Day		
			No Classes		
14	Tuesday	30-May	Exam 2 Chapters 5, 6, 7		
			Homework 7		
15	Wednesday	31-May	No Class - Fly to ACMS Meeting		
16	Thursday	1-Jun	No Class - ACMS Meeting	Chapter 8 reading	
				Chapter 8 videos	
	Friday	2-Jun			OA 8
17	Monday	5-Jun	Chapter 8	Chapter 10 reading	Quiz 8
				Chapter 10 videos	OA 10
18	Tuesday	6-Jun	Chapter 10		
			Homework 8		
19	Wednesday	7-Jun	Chapter 10		
					Quiz 10
20	Thursday	8-Jun	Final Exam **Comprehensive**		
			Homework 10 - Budget Project		

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 303) 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 303 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.

Grading Distribution

Grade Distribution	
Two Tests at 20% each	40%
Final Exam	30%
Quizzes	5%
Written and/or Online Homework	12%
Group Project	5%
Individual Budget Assignment	5%
Class Participation	3%
Total	**100%**

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]

Grade components

The grade components are written homework, written tests, online homework, online quizzes, projects, class participation, and the final examination.

Other factors that affect grades

- **Late work:** 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. Work accepted late may be assessed a penalty. 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 an at least 70% of the course work is completed.
- **Questions on written assignments, tests, and exams:** Written assignments and test/exam questions and problems must be formulated carefully in terms of words and symbols used in the course. Credit is determined by the degree to which answers and solutions respond to the specific question or problem stated. Maximize your credit by learning the language and symbols of the course.
- **Written Assignments:** Assignments collected must be prepared in a style suitable for grading. The following guidelines are used to determine credit:
    - o the organization must be easy to follow
    - o the work must be legible
    - o complete solutions must be written for problems (not just answers); answers must be clearly marked
    - o 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 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. **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.**

Final Exam: Date and Time – June 8, 2017

    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.

Attendance
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 http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Class_Attendance in the Undergraduate Academic Catalog.

NOTE: For Blended courses, attendance will be calculated as follows:

Face to face portion of the class:
You must be present on time for the full class for you to be considered present in the face to face meeting.

Online portion of the class:
You are expected to work on material online every week. In order to get credit for being "present" in the online portion of the class each week you must complete at least one online homework assignment or exam review assignment (for test weeks) before the due date/time for that week.

You will receive a warning if you miss 10% of the class (combination of face-to-face and online).

You will be automatically de-enrolled if you miss 20% of the class (combination of face-to-face and online).

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.

Academic Accommodations
If you have a diagnosed disability, please contact PLNU's Disability Resource Center (DRC) within the first two weeks of class to demonstrate need and to register for accommodation by phone at 619-849-2486 or by e-mail at DRC@pointloma.edu. See Disability Resource Center for additional information. For more details see the PLNU catalog: http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Academic_Accommodations

Students with learning disabilities who may need accommodations should discuss options with the instructor during the first two weeks of class.

Academic Honesty
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 http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Academic_Honesty for definitions of kinds of academic dishonesty and for further policy information.

Copyright Protected Materials:
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.

FERPA Policy
In compliance with federal law, neither PLNU student ID nor social security number should be used in publicly posted grades or returned sets of assignments without student written permission. This class will meet the federal requirements by (Note: each faculty member should choose one strategy to use: distributing all grades and papers individually; requesting and filing written student permission; or assigning each student a unique class ID number not identifiable on the alphabetic roster.). Also in compliance with FERPA, you will be the only person given information about your progress in this class unless you have designated others to receive it in the "Information Release" section of the student portal. See Policy Statements in the (undergrad/ graduate as appropriate) academic catalog.

Classroom Attire
All students are expected to dress in ways that allow the classroom to be a place where all students are comfortable and can work efficiently. Certain distracting attire is not permitted in the classroom. For example, attire associated with the "rush" activities of fraternities and sororities simply causes too many distractions in the classroom. If you choose to "rush" one of the fraternities or sororities, please make sure the "rush" officials know that "rush" attire will not be allowed in this classroom.

THE FINAL EXAM IS A COMPREHENSIVE **EXAMINATION.** Successful completion of this class requires taking the final examination on its scheduled day. **The FINAL EXAM is on the last day of classes in the same classroom.** No requests for early examinations or alternative days will be approved.

References

- Baron, J. B. and Sternberg, R. J. Teaching Thinking Skills: Theory and practice. (1987). New York: W. H. Freeman.
- Bransford, J. and Stein, B. (1984). The Ideal Problem Solver. New York: W. H. Freeman.
- Brown, Stephen I., and Marion I. Walter. (1983). The Art of Problem Posing. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Cheney, L. (Ed.) (19) 50 Hours (Cheney Report). HEW
- Curcio, F.R. (Ed.). (1987). Teaching and Learning: A problem solving focus. Reston, VA: NCTM.
- Duncker, K. (1945). On problem solving. Psychological Monographs 58, No. 5 Whole # 270.) Washington, DC: American Psychological Association.
- Dunham, William. (1990). Journey Through Genius: The great theorems of mathematics. New York: John Wiley & Sons.
- Eves, Howard. (1990). Foundations and Fundamental Concepts of Mathematics. 3rd ed. Boston: PWS-KENT.
- Eves, Howard. (1983). Great Moments in Mathematics. (2 vols.). The Mathematical Association of America.
- Gardner, Howard. (1985). The Mind's New Science. New York: Basic Books.
- Hofmann, J. E. (1957). The History of Mathematics. New York: Philosophical Library.
- Kilpatrick, Jeremy. (1987). "Problem Formulating: Where Do Good Problems Come From?" Cognitive Science and Mathematics Education, edited by Alan H. Schoenfeld, pp. 123-48. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Kline, M. (1962). Mathematics: A Cultural Approach. Reading, MA: Addison-Wesley.
- Kline, M. (1953). Mathematics in Western Culture. New York: Oxford University Press.
- Krulik, S. (Ed.). (1980). Problem Solving in School Mathematics. 1980 Yearbook of the National Council of Teachers of Mathematics. Reston, VA: NCTM.
- National Research Council. (1989).Everybody Counts: A Report to the Nation on the Future of Mathematics Education. Washington, DC: National Academy Press.
- Newell, A., and Simon, H. (1972). Human Problem Solving. Englewood Cliffs, J: Prentice-Hall.
- Papert, S. (1980). Mindstorms: Children, computers, and powerful ideas. New York: Basic Books.
- Paulos, John A. (1988). Innumeracy: Mathematical illiteracy and its consequences. New York: Hill and Wang.
- Peterson, Ivars. (1988). The Mathematical Tourist. New York: Freeman.
- Peterson, Ivars. (1990). Islands of Truth: A mathematical mystery cruise. New York: Freeman.
- Polya, G. (1945). How To Solve It. Princeton: Princeton University Press.
- Polya, G. (1954). Mathematics and Plausible Reasoning (2 vols.). Princeton: Princeton University Press.
- Polya, G. (1962 [Vol. 1] and 1965 [Vol. 2]; combined paperback edition, 1981). Mathematical Discovery. New York: Wiley.
- Polya, G., & Kilpatrick, J. (Eds.). (1974). The Stanford Mathematics Problem Book with Hints and Solutions. New York: Teachers College Press.
- Rolf, Howard L. (1988). Mathematics. Dubuque, IA: Wm. C. Brown.
- Schoenfeld, A. (1985). Mathematical Problem Solving. New York: Academic Press.
- Schoenfeld, A. (Ed.). (1987). Cognitive Science and Mathematics Education. Hillsdale, NJ:Lawrence Erlbaum.Steen, Lynn A. (Ed.) (1990). On the Shoulders of Giants: New Approaches to Numeracy. Washington, D.C.: National Academy Press.
- Tannenbaum, P. & Arnold, R. (1992). Excursions in Modern Mathematics. Englewood Cliffs, NJ: Prentice-Hall.
- Taylor A. (19950). Mathematics and Politics. Strategy, Voting, Power, and Proof. Springer-Verlag.
- Wickelgren, W. (1974). How to Solve Problems. San Francisco: W. H. Freeman.