

**Department of Mathematics
Pomona College**

**Math 29. Advanced Problem Solving
Fall 2013**

Course Syllabus

Time and Place:	MWF 9:00 am-9:50 am, Lincoln 1135.
Instructor:	Dr. Adolfo J. Rumbos
Office:	Mudd Science Library 106.
Phone/e-mail:	ext. 18713 / arumbos@pomona.edu
Office Hours:	MWF 8:05 am-8:55 am, TR 9:00 am – 10:00am, or by appointment
Text:	<i>Quantitative Reasoning: Understanding the Mathematical Patterns in Nature</i> by Frederick P. Greenleaf, Third Edition, MacGraw-Hill, 2006
Courses Website:	http://pages.pomona.edu/~ajr04747/

Course Description. The main goal of this course is to enhance students' analytical and mathematical skills needed to deal with a variety of problems that arise in the sciences. The best way to get better at problem solving is to work on a lot of problems. In this course we will be doing just that, in a cooperative environment. During each class, students will work in groups on problems coming from modeling real-world situations in the context of the physical, biological, social and environmental sciences.

Course Requirements.

1. *Group Problems.* Students will be divided into groups and given problem sets to work out in each class period. This is a collaborative effort, and everyone must participate. The group work will begin in class and continue outside of class in the mentor sessions. Each group is expected to work on all problems in each problem set.
2. *Problem Solving Journals.* Students will neatly and carefully write up solutions to the in-class problems in a special notebook, which we shall refer to as a *Problem Solving Journal*. This journal notebook is to be separate from a notebook used for taking notes during lectures and student presentations. The journals will be reviewed regularly throughout the semester in order to provide feedback on your progress.
3. *Presentations.* Students will also be required to present to the class solutions to problems they have already written up in their journals.
4. *Homework Assignments.* At each class meeting, homework assignments will also be given; these will be collected on an alternate basis. The homework assignments will be based on

the mathematical topic covered during problem solving sessions, as well as the assigned readings from the text.

5. *Exams.* There will be two tests throughout the semester (see attached *Tentative Schedule of Topics and Examinations*) and a final exam scheduled for **Tuesday, December 17, 2013 at 9:00 am.**

Evaluation. Grades will be based on presentations and solutions to assigned problems, two 50-minute examinations, and a final exam. The overall score will be computed as follows:

Problem solving journal	15%
Presentations	10%
Assignments	15%
Two 50-minute exams	40%
Final exam	20%

Rules for group work. Everybody in each group is expected to participate in the process of coming up with solutions to the in-class problems. Here are some basic expectations regarding group work:

1. Everyone in the group must understand the statement of the problem. It is everybody's responsibility to make sure that everybody in the group understands what the problem is asking.
2. Everybody must participate in the problem solving process. This may involve asking clarifying questions, suggesting approaches, performing all relevant calculations, etc.
3. Everybody must understand the solution to a given problem that the entire group has figured out.

Expectations regarding write-ups. Even though students work in groups in the process of coming up with solutions to the problems, each student must write up solutions in the journals individually. Each student must express the solution in her or his own words. These write-ups must be complete. They must include a statement of the original problems, definition of all the pertinent variables, and an explanation of the process leading to the solution. A scattering of symbols, formulas and calculations is not enough.

Tentative Schedule of Topics and Examinations

Date	Topic
W Sep. 4	Measurements and units.
F Sep. 6	Measurements and units.
M Sep. 9	Measurements and units.
W Sep. 11	Solutions and dilutions.
F Sep. 13	Solutions and dilutions.
M Sep. 16	Solutions and dilutions.
W Sep. 18	Estimations.
F Sep. 20	Estimations.
M Sep. 23	Estimations.
W Sep. 25	Relationships between variables.
F Sep. 27	Relationships between variables.
M Sep. 30	Relationships between variables.
W Oct. 2	Relationships between variables.
F Oct. 4	Rates of growth and decay.
M Oct. 7	Rates of growth and decay.
W Oct. 9	Rates of growth and decay.
F Oct. 11	Rates of growth and decay.
M Oct. 14	Review
W Oct. 16	Exam 1
F Oct. 18	Triangulation, surveying and mapping.
M Oct. 21	<i>Fall Recess.</i>
W Oct. 23	Triangulation, surveying and mapping.
F Oct. 25	Triangulation, surveying and mapping.
M Oct. 28	Triangulation, surveying and mapping.
W Oct. 30	Probability.
F Nov. 1	Probability.

Date	Topic
M Nov. 4	Probability.
W Nov. 6	Expected values.
F Nov. 8	Expected values.
M Nov. 11	Expected values.
W Nov. 13	Decision problems.
F Nov. 15	Decision problems.
M Nov. 18	Decision problems.
W Nov. 20	Scales.
F Nov. 22	Scales.
M Nov. 25	Scales.
W Nov. 27	Scales.
F Nov. 29	<i>Thanksgiving Recess.</i>
M Dec. 2	Scales.
W Dec. 4	Review
F Dec. 6	Exam 2
M Dec. 9	Review
W Dec. 11	Review
Tu Dec. 17	Final Examination at 9:00 am