

California State University, San Bernardino
College of Natural Sciences/Math Department
Math 308-02: Problem Solving through Theory and Practice
Fall 2016

Course and Instructor Information

Instructor: Dr. Shawn McMurrin
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Office hours: Monday and Wednesday 4 – 5 pm,
Tuesday and Thursday 2 – 3 pm, and by appointment
Class Days/Time: Thursday 12 – 1:50 pm
Classroom: JB 386
Course site: <http://blackboard.csusb.edu>

Course Description

Welcome! One goal of this course is to develop an appreciation of and facility for mathematical and logical problem solving. During the quarter we will explore heuristic techniques in solving contextual problems from areas such as algebra, number theory, geometry, logic, probability and statistics.

One of our key objectives is to communicate mathematics verbally and in writing in order to be better teachers of mathematics. Problem solving provides an opportunity to write and verbalize mathematics, which in turn will improve our ability to think logically and abstractly.

Prerequisite: MATH 301C with a grade of at least "C"

Text and Course Website (BlackBoard)

Text: *Powerful Problem Solving: Activities for Sense Making with the Mathematical Practices* by Max Ray

Text: *Problem Solving in Mathematics* (2015 edition) by Fischman and McMurrin, available in the bookstore or as a pdf on BlackBoard

Other Resources: The course syllabus, assignments and other class documents will be posted on BlackBoard. You should check our site regularly for new postings and announcements.

Important Dates

Oct 12:	Census	Nov 24:	Campus closed for Thanksgiving
Oct 27:	Midterm Exam	Dec 8:	Final Exam 12-2 pm

Student Learning Objectives

CSUSB Math Department

http://www.math.csusb.edu/LS_SLO_2013.html

1. Develop conceptual understanding of mathematical topics.
2. Possess knowledge of and have an understanding of mathematics that is considerably deeper than that required for the school mathematics that the students will teach.
3. Understand their role as a teacher of mathematics including the ability to communicate and explain mathematical ideas with ease and clarity, both verbally and in writing. This includes the ability to construct viable arguments and critique the reasoning of others.
4. Make mathematical connections between topics, reason abstractly and quantitatively, and use appropriate and accurate representations involving numbers, symbols, words, and pictures.
5. Develop problem-solving skills, make sense of problems, and persevere in solving them. This includes the ability to: organize and analyze information, solve problems readily using multiple solution strategies, construct logical arguments, interpret results, and examine the reasonableness of an answer.
6. Demonstrate procedural fluency and mastery of basic skill computations and concepts.
7. Develop a productive disposition - the habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy.

The course goals and objectives are consistent with the goals for students in grades K-12 as outlined in the *California Common Core State Standards* adopted by the California State Board of Education and also with the recommendations for the preparation of teachers of mathematics by the Mathematical Association of America. Please visit <http://www.cde.ca.gov/re/cc/> and www.maa.org for more information.

Grading Policy

Grading for this course is not competitive, nor is it “curved”. Working cooperatively with your classmates is encouraged and will more than likely be beneficial to all involved.

Final	30%
Midterm	25-30%
Homework Assignments	25-30%
Reading Assignments	15%
Attendance	<u>See explanation below</u>

Grade Breakdown:

A(93-100), A-(90-92), B+(87-89), B(83-86), B-(80-82), C+(77-79), C(73-76), C-(70-72), D+(67-69), D(63-66), D-(60-62), F(59 and below)

Course Expectations

Homework

Homework – both written and online – will be assigned weekly. All tasks will be outlined in the weekly assignment sheet. *Start your homework early so that you will have time to ask questions during the week before it is due.*

Homework problems will be assessed on whether or not the solution shows mastery of the learning goals relevant to that problem. You may resubmit up to 4 problems. You have one week to resubmit a problem after it has been returned.

Reading Assignments

Readings and writing tasks from the text *Powerful Problem Solving* will be assigned weekly.

Celebrations of Learning (Exams)

We will have one midterm and one final exam based on class discussion and assigned homework. The final exam will be cumulative. If your final exam score is higher than your midterm score, then the final exam score will be weighed more heavily.

- Calculators will not be allowed on any exam or test.
- Tests will have problems that can be solved using techniques developed in the homework and class discussions. Solutions will be assessed on both technical elements and professional quality. Answers without any supporting work will not receive credit.
- If you miss an exam you will receive a 0 for that exam. Make-up exams WILL NOT be given without serious, compelling and documented reasons for your absence.

Class Participation and Attendance

This course is a seminar and as such attendance is required. Because of the interactive nature of this course your participation is essential in creating a productive classroom environment. Students will work on problems in small groups during most of each class.

“Participation” means behavior that helps everyone in class learn. This includes staying on task as well as contributing ideas, suggestions, answers – and questions! – to the discussion. More than one absence will result in an overall grade reduction of 5 percentage points per class missed. Extreme or persistent tardiness or early departure will count as a partial absence. If missing a class is unavoidable, it is your responsibility to find out what you missed from another student or from the class website and study the material on your own.

REMEMBER: Since this is a 2-unit upper division class, students who wish to succeed should expect to average about **4-5 hours per week** outside of class on reading, studying and homework. Keeping up with your out-of-class work is essential for your success in this class!

Intellectual Honesty

You are encouraged to discuss assignments and work together with your classmates. However, *individual work must be your own and must be written up independently.*

Copying work done by another is plagiarism. Copied homework will not be tolerated; copied or substantially identical assignments will receive no credit for the entire assignment, regardless of who did the work. Refrain from giving your homework to a classmate to “look” at because you will share responsibility if your assignment is copied, even if it is copied without your permission.

Collaborative work will undoubtedly lead to use of similar strategies and ideas. Be sure to give credit if you worked with someone else, used a classmate’s idea, or used outside resources. Professionals always give credit where it is due using footnotes, bibliographies, references, and acknowledgements.

You should refrain from using outside sources (i.e., the internet) to solve the assigned problems. Future teachers should develop a high level of self-efficacy. Reliance on “ready-made solutions” undermines this goal. If you do use an outside source, you must cite your source and you may receive a lower score. If you do not cite your source, then you may receive a 0 on the entire assignment for a first offense and fail the course for a second offense.

Classroom Protocol

- **Please silence and put away your cell phone unless its use is appropriate for a given task.**
Please, be courteous to both your instructor and your classmates. It is unprofessional to text message or engage in off-task activities during class. Such behavior may result in an absence for the day.
- In the event that class is unexpectedly canceled (e.g., fire, winds), it is your responsibility to check your campus email and BlackBoard for notifications concerning the material, reading, and assigned tasks that you will need to do for that day.

University Policies

Support for Students with Disabilities

If you are in need of an accommodation for a disability in order to participate in this class, please contact Services to Students with Disabilities at UH-183 (909)537-5238. <https://ssd.csusb.edu/>. It is the student's responsibility to seek academic accommodations for a verified disability in a timely manner.

Plagiarism and Cheating

Students should be familiar with the University’s Policy on cheating and Plagiarism. Please review this policy in the CSUSB Bulletin or at <http://bulletin.csusb.edu/academic-regulations/>.

Dropping and Adding

You are responsible for understanding the policies and procedures about add/drops, academic renewal, etc., that can be found in the CSUSB Bulletin. (See above link.)

Socratic Teaching

I often respond to a question with another question. This response in no way means that I think your question is not legitimate, so please don't hesitate to ask or post questions. When I respond with more questions rather than a direct answer, I am demonstrating my faith in your ability to reach a correct conclusion. The question I respond with is meant to build on yours. I am acknowledging that you have made a step in the right direction and/or identified a key point. Or, perhaps you are not on the right track, but I believe you can find it with a nudge in the right direction. The intent of my question is to push you closer to discovering the answer on your own. Sometimes it takes a sequence of such questions to arrive at an answer.

I realize that the concepts we deal with in this class can be very challenging. Sometimes, it would be easier to simply provide the correct answer to a question. But, part of my job is to help you further develop your ability to think critically and problem solve. I believe that the answers we arrive at via our own reasoning lead to powerful learning.

This approach is called the Socratic method. By probing into a subject with questions, we develop an inquiring mind that can seek solutions to problems in a critical and logical way. This is a skill that potential employers look for and value.

So, please share your questions and comments! I value your input and it lets me see what you are thinking. And if I respond with another question, know that it is because I respect your ability to learn.

For more information on Socratic teaching, see <http://www.criticalthinking.org/pages/socratic-teaching/606>.

For more information on the Greek philosopher Socrates see <http://plato.stanford.edu/entries/socrates/>.