

**Math 181 A: Advanced Problem Solving:  
Historical and Pedagogical Contexts, Spring 2006**

Instructor: Bill Jacob

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Office Hours: Monday, 10:00-12:00, Wednesday, 1:00 to 2:00, also by appointment.

Text: Math 181 A Reader. Available at the Alternative Copy Shop in Isla Vista.

Final Exam: Tuesday June 11: 8:00 – 11:00 a.m.

*Attendance:* You must be punctual and always attend class. It is not possible to complete the work for this course if you miss class. We will have an enjoyable time in this class, but if you are the type of person who likes to skip class meetings and do all the work prior to exam week, please leave now.

*The Course:* The purpose of this course is to take an in-depth look at the recent use of problem-solving as a basis for mathematics instruction. During the past decade, the National Science Foundation as well as other federal and private agencies have supported the development of new mathematics curricula, a number of which are used in local schools. Students who complete this course will have a better understanding of how these curricula are designed to promote students' conceptual understanding of mathematics. We will also examine some of the controversies that surround the new curriculum.

Problem solving will be studied from three points of view.

- First, students will be expected to collaborate on a number of challenging mathematical questions and to examine their thinking process.
- Second, the class will study some of the recent literature in mathematics education dealing with problem solving, as well participate in a pilot of video case studies developed by Cathy Fosnot of City College New York and Maartin Dolk of the Fruedenthal Institute in the Netherlands.
- Third, we will study problem solving through the lens of the history of mathematics. The themes this quarter will be Number Theory and Biomathematics.

*Course work:* You will be required to turn in four papers this term. A fifth assignment will require a class presentation on the day of the final exam, and will be described later. The four written assignments will be based upon class problem solving experiences as well as reflective writing on readings and videos that were part of classroom discussion.

You should keep careful notes about your problem solving work in this class (a "journal" so to speak), because in your written papers you will have to describe the steps in your problem solving, and it is easy to forget what you have done if you do not have a written record.

In determining your grade, the four papers will be worth 60%; class participation and readiness 20%, and the final presentation 20%. Quite often, at the end of class you will be asked to think about a particular part of a question or to read an article prior to coming to the next class. If you don't follow through on these assignments it drags the class down. I'll keep track of people who are not prepared for class and it will be reflected in grades at the end of the term. If you are planning on only working the night before assignments are due, it would be a good idea to drop this course.

*Class Format:* Typically Monday will be devoted to problem-solving, and Wednesday to discussion, including watching video cases. You will have regular assignments of readings from your reader. Additional articles may be distributed during the term.

*Assignment Write-up Format:* You will be provided with written instructions for each assignment, which you should follow closely. Each assignment will have a different emphasis, and they will entail more than merely writing up the solution to a problem. You will be given ample time to work on your writing, and if we are not satisfied with the work it may be returned to you for revision. The first paper will be due Wednesday April 24.

The quality of writing in your project writes-ups is extremely important. **You must pay close attention to write up instructions which will vary each time.** You will be scored according to the following five-point rubric:

5. Discovery and explanation of mathematical connections beyond immediate solution or classroom discussion. The exposition illustrates understanding of several points of view. Innovative extensions and/or teaching/learning connections discussed. (This score is reserved for papers making a special contribution.)
4. Accomplished task. Problem statement, historical contexts (if appropriate), process, solution, clearly explained. Writing clearly demonstrates understanding of the issues or conflicts raised in class.
3. Progress made, but total picture not fully assembled or communicated. Discussion of learning issues may not be linked to the problem solving.
2. Needs revision. Portion of write-up unclear or improperly done.
1. Needs to be fully rewritten It is incomplete or the main point was missed.