

Mathematical problem solving for teachers
MWF 2:00-2:50pm
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Spring 2011

Instructor: Russell Brown
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Office hours: M 3-4
WF 11–12 and by appointment.

Text: *How to solve it.* second edition, G. Polya. *What is mathematics?* second edition, R. Courant, H. Robbins, revised by Ian Stewart. Readings will be assigned from these books during the course of the semester.

In addition, there will be a few readings related to using problem solving in the classroom. These will be distributed during the semester.

Goal: During the semester, students will develop mathematical ideas by solving problems. They will be expected to present solutions to these problems and explain their reasoning. Our goals are to improve our ability understand and use new mathematics and to develop our ability to explain mathematics to our peers. An exposure to problem solving will help prospective teachers in several ways. a) We will develop the skills needed to learn new mathematical content. b) Prospective teachers will learn about competitive problem-solving and thus be prepared to challenge their best students. c) We will practice developing a topic through a series of problems.

Course web site: Assignments and other useful material may be found at the course website <http://www.math.uky.edu/~rbrown/courses/ma310.s.11/>

Problems: (20%) Students will be asked to present problems in class on a regular basis. In addition, a few of the problems will be collected and graded. The problems will be selected from the following topics Induction, Combinatorics, Complex numbers, Solving polynomial equations, Geometry, Polyhedra.

Participation: (20%) Students will be graded on the number of problems they present in class and the quality of these presentations. This component of your grade will also include a few quizzes designed to encourage students to complete reading assignments.

If M is the median score in this category, a student score who earns A points will be earn $20\% * \min(1, A/M)$ toward their final grade.

Exams: (10%+10%+20%) We will have two exams and a final. The exams will be based on the problems we work in class. Exams are tentatively scheduled for 16 February and 30 March 2011. Our final will be 1–3 pm on Monday, 2 May 2011.

Projects and short essays: (20%) Students will be asked to complete several written assignments. Typical assignments include.

- Illustration of section from *How to solve it*.
- Summary of reading about problem solving.

- Poster illustrating visual solution of a problem.
- Set of problems.

Details and due dates to follow.

Academic integrity: Students are encouraged to work together on homework. As in any endeavour, collaborative efforts should be acknowledged. Students should not copy solutions from another source, or present solutions that they had no hand in constructing.

Collaborative work during exams is not allowed.

Academic Accommodations: If you have a documented disability that requires academic accommodations, please see me as soon as possible. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, jkarnes@uky.edu) for coordination of campus disability services available to students with disabilities. We can then collaborate on the best solution.

March 28, 2011