

# COURSE ANNOUNCEMENT

## MATH 419/619

### TECHNIQUES of PROBLEM SOLVING

**Fall Semester 2008**

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Most of the concepts used in this class are found in high school textbooks. But the problems involving these concepts and the techniques of solving them will be new and sometimes challenging. This course is intended to illustrate the beauty of elementary mathematics, with competition type problems. We will do proofs and careful exposition, which will help the students to better appreciate advanced and abstract mathematics when they encounter it.

Topics will include: strategies for problem solving (search for a pattern, draw a picture, exploit symmetry, divide into cases, work backwards, argue by contradiction), important principles (induction, recursion, pigeonhole), arithmetic (greatest common divisor, modular arithmetic, primes, unique factorization), counting and probabilities, polynomials and identities, inequalities, real analysis (sequences and series, Intermediate Value Theorem, Mean Value Theorem, L'Hôpital's Rule), classical plane geometry.

We will also introduce complex numbers, some abstract algebra, and other topics, depending on the audience preferences. The emphasis will be on applications, and on being able to use these techniques to solve many problems.

*Note: The material in this class is not covered in any other course. It is especially appropriate for students preparing to become Math teachers, for the Putnam Competition, and for all those people wanting to improve their exposition and problem solving skills.*

**Textbook** - Loren C. Larson, Problem-Solving Through Problems, ISBN 0387961712, Springer 1992. There will be also some handouts.

**Prerequisites**- Special interest in solving problems; Math 310 or permission of the instructor.