Mathematics 5346 Concepts and Techniques in Problem Solving Spring 2013

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	Course Goals ¹

To explore problem solving in mathematics as: a curricular goal, an instructional strategy, the essential core of mathematics, a process for doing mathematics

To develop a "can do" approach to mathematics problem solving.

To understand and describe mathematics problem solving as more process than product.

To become a mathematics problem solver.

To use technology to solve mathematics problems.

To use problem contexts to create mathematics demonstrations.

To use problem solving to construct new ideas of mathematics for yourself.

To engage in mathematical investigations.

To engage in some independent investigations of mathematics topics from the secondary school curriculum or appropriate for that level.

To communicate mathematics ideas that arise from mathematics investigations.

To consider ways to assess problem solving performance.

Overview

This course will concentrate on solving, or attempting to solve, mathematics problems. The foundation of the course rests upon the idea that one cannot implement problem solving goals and activities in your mathematics instruction without first becoming a problem solver.

The emphasis is on exploration of various mathematics contexts to learn mathematics, to pose problems and problem extensions, to solve problems, and to communicate mathematical demonstrations.

The problems will come from many sources and contexts. The primary ground rule is that the problem situations can be investigated with pre-calculus mathematics. We will use problem contexts to pose problems, explore mathematical relationships, and examine the use of resources -- media, technology, references, or colleagues -- to engage in mathematics problem solving. Inquiry, investigation, exploration will be significant descriptors of what we want to accomplish.

I will conduct the course in a seminar-style manner with few lectures. I will normally act as a "moderator" while you (the students) present exercises and justifications to one another. I will answer appropriate questions and steer discussions into productive channels.

This course will be taught with an emphasis on writing, collaborative learning, and oral presentations. Memorization and formulae will not be emphasized in this course.

Materials: Textbooks: Teaching Mathematics through Problem Solving Grades 6-12, NCTM, 2003 (ISBN #0-87353-541-3) & Five Practices for Orchestrating Productive Mathematics Discussions, NCTM, 2011 (ISBN #978-0-87353-677-6).

- □ Additional materials will be handed out during class.
- □ 3-ring binder to store handouts and articles.
- □ TI-84 (or equivalent) Graphing Calculator
- Colored pencils and grid paper.

¹ Modeled after J. Wilson's syllabus for EMAT 6600, see <u>http://jwilson.coe.uga.edu/</u>

Details About the Course

Electronic Communication Statement:

E-mail is a prime means for communication. Therefore, the University has the right to send communications to students via e-mail and the right to expect that those communications will be received and read in a timely fashion. The Office of Information Technology (OIT) will assign all students an official University e-mail address. It is to this official address that the University will send e-mail communications. Students are expected to check their official e-mail account on a frequent and consistent basis to stay current with University communications. The University recommends checking e-mail daily in recognition that certain communications may be time-critical.

Grades and Requirements:	Problem situations/Reflections	25%
	Reading assignments	25%
	Class Participation	15%
	Major project	<u>35%</u>
	Total	100%

Standard Grading Scheme: 90-100% A; 80-89% B; 70-79% C; 60-69% D; 59% or below F.

Course Assignments:

- 1. <u>Problem situations/Reflections</u> We will be working on a set of challenging problem situations and you will also generate rich problems for your classroom. You will be required to hand in a neat write-up of your solution procedures, explanations, reflections and extensions. You also will be required to reflect upon the tasks presented in class using a prescribed format (at times, rather than turning in a solution, this is a reflection upon the problem solving strategies, heuristics, etc., used)—these reflections will be no more than 2 pages in length. Typically, you will have two weeks to prepare these assignments and they will be collected approximately every other week (alternate weeks from the readings).
- <u>Reading assignments</u> Reading assignments will be given over the course of the semester. You will write a 2- page reflection on each article or book chapter assigned. Note that each *assignment* may contain more than one article/chapter reflection. Typically, you will have two weeks to prepare these assignments and they will be collected approximately every other week (alternate weeks from the problem situations/reflections). For each article/chapter that you read, turn in the following:
 - The bibliographic information (list this as the first entry on your reflection)
 - 1-2 paragraphs briefly summarizing the major point/s of the book chapter or article. Do not use the abstract as the summary. Full credit will only be given if it is clear that you have understood the article.
 - 1-2 paragraphs of your interpretation of the article as it would affect your own teaching with specific references to the article. This could include a critique, a description of what you found most/least useful or an example from your own teaching that relates to the article.

The write-up for each article/chapter should not exceed 2 double-spaced (12pt type) pages.

- 3. <u>Major Project</u> Design problem solving activities for the classroom that are grounded in the Texas Essential Knowledge and Skills with particular emphasis on the mathematical process standards that are relevant to the subject/grade-level you choose. You are to organize your project by writing about the rationale for the activity, reflections on the activity (what did you learn as a teacher? How did the students react to the activity? Did the activity elicit positive problem solving behaviors, etc.), revisions that you may make after trying the activity, your 5E Lesson Plan for the activity and samples of student work on the activity. You will receive more information regarding the structure of the project during the 4th week of the semester. You will make a poster presentation of your project on April 29th and then submit your project to the instructor by May 6th.
- 4. <u>Participation</u> Since this course relies heavily on group participation, more than one absence from our weekly class time or excessive late arrivals to or early departures from class will lower your final grade. In addition to regular class attendance, participation in class is essential (e.g. periodically, you will be asked to share your thoughts on the mathematical task or an assigned reading, solution methods, both in your groups and at the board). For each unexcused absence, your participation grade will be lowered by 10 points. For each class meeting in which you have not prepared sufficiently (i.e. do not have your written assignments for sharing), your participation grade will be lowered by 5 points. For each excessive tardy (more than 10 minutes late), 1 point will be deducted for every 15 minute interval missed. Each of you begins the semester with 100 participation points.

Please note that class begins at 5:30. Since this course relies heavily on group participation, more than one absence from our weekly class time or excessive late arrivals to or early departures from class will lower your final grade.

Mathematics 5346, Spring 2013 Dr. Epperson **The university requires this attachment to the syllabus:**

Americans with Disabilities Act: The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at <u>www.uta.edu/disability</u> or by calling the Office for Students with Disabilities at (817) 272-3364.

As a faculty member, I am required by law to provide "**reasonable accommodation**" to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with **informing faculty** <u>at the beginning of the semester</u> and in providing *authorized* **documentation through designated administrative channels.**

If you require an accommodation based on disability, I would like to meet with you in the privacy of my office, during the first week of the semester, to make sure you are appropriately accommodated.

Academic Integrity: All students enrolled in this course are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

Instructors may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

Academic Dishonesty: It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University.

"Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts." (Regents Rules and Regulations, Part One, Chapter IV, Section 3, Subsection 3.2, Subdivision 3.22)

Grade Replacement and Grade Exclusion Policies: Not applicable to graduate students.

Student Disruption: The University reserves the right to impose disciplinary action for an infraction of University policies. For example, engagement in conduct, alone or with others, intended to obstruct, disrupt, or interfere with, or which in fact obstructs, disrupts, or interferes with, any function or activity sponsored, authorized by or participated in by the University.

Drop for Non-Payment of Tuition: If you are dropped from this class for non-payment of tuition, you may secure an Enrollment Loan through the Bursar's Office.

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as lecture, seminar, or laboratory shall be directed to complete a Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit <u>http://www.uta.edu/sfs</u>.