

MASC 351 ~ Problem Solving In Mathematics Fall 2009~Syllabus

Instructor	Mary Margaret Capraro	E-mail	mmcapraro@tamu.edu
Phone	845-8227; 575-6520 (cell)	Office Hours	Tues 3-5 pm or by appointment
Office	EDCT 421		
Class Time	Tuesdays	5:45-8:30 pm	Room: EDCT 104

Course Description

Problem Solving Strategies in math and science; evaluate conjectures and arguments; writing and collaborating on problem solutions; posing problems and conjectures; constructing knowledge from data; developing relationships from empirical evidence; connecting mathematics concepts; readings, discussions, and analyses will model and illustrate mathematics problem solving and proofs.

Prerequisites

Junior classification, 9 hours of 300 level math courses

Learning Outcomes

The EC-6 preservice teacher will

- + build new mathematical knowledge through problem solving;
- + solve problems that arise in mathematics and in other contexts;
- + apply and adapt a variety of appropriate strategies to solve problems;
- + monitor and reflect on the process of mathematical problem solving.
- + use technology as appropriate to solve problems.
- + Explain the interrelationship between society and mathematics, the structure of mathematics, and the evolving nature of mathematics.
- + Create and use appropriate assessments to monitor and guide instruction.

Required Texts

Polya, G. (1985). *How to solve it: A new aspect of mathematical method*. Princeton, NJ: University Press.
Articles Assigned

Recommended Texts

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: NCTM.

Grades

Grades will be assigned as follows:

- 900 – 1000 pts. A
- 800 – 899 pts. B
- 700 – 799 pts. C
- 600 – 699 pts. D

Note: This course must be completed with a grade of “C” or better prior to the residency semester.

Completeness and Promptness

Only assignments submitted complete and on time will considered for full credit. **All assignments should be typed.**

Assignment Format

All assignments must be submitted electronically unless specified. It is highly recommended you save all your work electronically and also a hardcopy for your records before turning it in. The following format is required for every assignment submitted. Deviating from the format may result in reduced points, returned paper, or rejection of the assignment completely. **Required format:** All submissions must be typed in readable size font. **You must label your assignment as you save it containing your last name and the assignment name.** Example:

Capraro/locker.doc

Late Assignments

Only assignments submitted complete and on time will be considered for full credit. You will have a range of six days to complete assignments each week. When the assignment is posted, the range of dates for submission will be posted along with the assignment. Once the assignment is taken off-line, it can no longer be submitted. Without evidence, that you were unavailable (sick) for the entire range of days the assignment will be given a zero. Any assignments turned more than one week late or the range of dates for submission will receive zero points. Assignments for each week will be posted at 5 pm on Tuesdays and will be taken off line on next Monday evenings at midnight.

Attendance

Attendance of individuals in the class is required and will result in a grade reduction. University rules regarding absences will be followed for the thirteen required meetings.

Participation and Professionalism

All teaching candidates are expected to demonstrate the ethical and professional values associated with Middle Level Education. It is critical teaching candidates adopt and exhibit a professional demeanor at each point in their teacher preparation. Evidence of professional dedication will be expected through all work during classes and practicum, seminar, internship, and clinical experiences. Credit for participation and professionalism will be part of the evaluation.

Students with special needs

The American with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protections for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides a reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please notify your instructor and contact the Office of Support Services for Students with Disabilities in Room B118 of the Cain Building, phone number 845-1637. For additional information visit: <http://disability.tamu.edu>

The course will be conducted with openness and respect to all individuals' points of view and experience. The activities and discussions will not tolerate discrimination or prejudice toward any person or group's religion, ethnicity, disability, gender, or sexual orientation.

Departmental Statement on Diversity

The Department of Teaching, Learning and Culture (TLAC) does not tolerate discrimination, violence, or vandalism. TLAC is an open and affirming department for all people, including those who are subjected to racial profiling, hate crimes, heterosexism, and violence. We insist that appropriate action be taken against those who perpetrate discrimination, violence, or vandalism. Texas A&M University is an Affirmative Action and Equal Opportunity institution and affirms its dedication to non-discrimination on the basis of race, color, religion, gender, age, sexual orientation, domestic partner status, national origin, or disability in employment, programs, and services. Our commitment to non-discrimination and affirmation action embraces the entire university community including faculty, staff, and students.

Statement on Plagiarism

All materials generated for this class (which may include but are not limited to syllabi and in-class materials) are copyrighted. You do not have the right to copy such materials unless the instructor expressly grants permission. As

commonly defined, plagiarism consists of passing off as one's own the ideas, words, writing, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have permission of that person. Plagiarism is one of the worst academic violations, for the plagiarist destroys trust among others. If you have any questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules, under the section "Scholastic Dishonesty."

Aggie Honor Code

"An Aggie does not lie, cheat, or steal or tolerate those who do."

For more information please consult Honor Council Rules and Procedures on the web

<http://www.tamu.edu/aggiehonor>

"On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work."

Signature of student

Course Components

- ✚ **Warm-up problems (42 pts.):** Found in the course content section and assignment sections. At the beginning of each week (14 problems – 3 points for each), I will post a problem and you will need to send me just your solutions – you do not need to explain your strategy. These are quick problems just to get you thinking. Submit each week by Monday evening at 11:59 pm. The specific dates are shown in the calendar.
- ✚ **Quizzes (10) (12 points each = 120 pts.):** Found in the Assessment Section. Ten quizzes will be given throughout the semester on line. The information tested will be taken from your Polya textbooks and any other readings and handouts. They will comprise of 10 questions in a multiple choice/T or F/ short answer format and a 2-point thought response questions. Submit each week by Monday evening at 11:59 pm. The specific dates are shown in the calendar.
- ✚ **Homework problems (HW# 1 – 12) (14 pts. each: 12 problems = 168 pts.):** Found in the Assignment Section. Write-ups of work solving problems solutions should be typed and submitted properly in the submission box or as an attachment. These will be graded on evidence that Polya's steps (see 14 point rubric) were followed to solve problems. Submit each week by Monday evening at 11:59 pm. The specific dates are shown in the calendar. Some problems will be presented as voice-over power points, others will be done using applets (interactive) on the computer, one as a movie clip, and others will be presented more traditionally.
- ✚ **Presentation HW#14 (140 pts.):** Each quartet (group of 4) students will present a lesson on a particular problem. We will arrange those groups during the second-class period. Your problem will be presented to the class **as though you were teaching in a middle grades classroom**. You must publish the presentation which should be in PowerPoint® format and must include the following:
 - Any necessary background information about the problem (prerequisite knowledge)
 - Major TEKS that will be covered (2-4 TEKS, choose a grade level)
 - Presentation of the problem
 - Evidence of the use of Polya's steps.
 - Explanation of how this problem can be used in the classroom
 - Presentations should be limited to 15-20 slides
 - All PowerPoints® must be submitted electronically and **published by due day**
- ✚ **Evaluation/Responses to Power Point Problems HW#15 (60 pts.):** You will evaluate each of the 12 powerpoint presentation of problems using the guidelines in the assignment section (a-f) (HW #15).

- ✚ **Position Paper HW#16 (150 pts.):** This is a 3 page single spaced paper about your views on problem solving and its importance to mathematics learning. You should demonstrate your understanding of theories of problem solving which you will gain via reading the textbook and at least three articles that you locate on problem solving (thus 4 references). Make sure your references including Polya are at the back of the paper using APA format. You need to include a summary of the articles, reflection on the articles related to Polya, and your own personal philosophy on problem solving. Check the internet for an APA sample reference. Make sure if you are using exact quotations from articles (use sparingly) you put quotations marks around the exact quote and the author and page number is placed at the end, i.e. "XXXXX" (Capraro, 2009, p.4).
- ✚ **Midterm Exam and Final Exam (150/150 pts. each):** An **in-class** test over some of the material covered during the first/second half of the semester with some "new" material. More details will be given prior to the test using the announcement tool in WebCT plus during the prior class period.
- ✚ **Evaluation of Course (20 pts):** Use the Pica website (<https://pica.tamu.edu>) at the end of the semester to evaluate the course and the professor. The announcement tool will let you know when this website opens up.

THE INSTRUCTOR RESERVES THE RIGHT TO CHANGE ANY PART OF THIS SYLLABUS DURING ANYTIME IN THE SEMESTER. STUDENTS WILL BE ADEQUATELY NOTIFIED WHENEVER CHANGES OCCUR using the announcement tool in WebCT.

Run off, sign, and bring to class the first day. _____ ++++++ _____

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I understand the Aggie Honor Code and will honor it the entire semester in MASC 351-Problem Solving. If I chose to not honor it, consequences will occur according to the University Rules concerning Plagiarism and the Aggie Honor Code.

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Signature of student

MASC 351 Tentative Class Calendar

Wk.	Assignments	Assignments Available at 5 pm (Tuesdays)	Assignments Close at 11:59 pm (Mondays)
1	Module 1 on-line Introduction, syllabus,	Orientation to WebCt September 1	September 7 HW# 1
2	Module 2 on-line	September 8	September 14 HW#2
3	Module 3 on-line	September 15	September 21 HW#3

4	Module 4 on-line	September 22	September 28 HW#4
5	Module 5 on-line	September 29	October 5 HW#5
6	Module 6 on-line	October 6	October 12 HW#6
7	Module 7 on-line Midterm Assessment	October 13 October 13	October 19 HW#7
8	Module 8 on-line	October 20	October 26 HW#8
9	Module 9 on-line	October 27	November 2 HW#9
10	Module 10 on-line	November 3	November 9 HW#10
11	Module 11 on-line	November 10	November 16 HW#11 Evaluate Powerpoints
12	Module 12 on-line	November 17	November 23 (HW#12)
13	Module 13 on-line	November 24	November 30 (HW#13)
14	Module 14 on-line Final Assessment Position paper	December 1 December 8	December 5* (HW#14)
#1 = Water Jugs #2 = Lockers #3 = Net Connections #4 = Number Table		#9 = Monty Hall #10 = Powerpoint Pres. of Problems #11 = HW Mangoes & Evaluate PPT #12 = Towers of Hanoi	
#5 = Maysy's Mechanical Advantage #6 = Cooper's Pen #7 = Paper Stacking #8 = Missionaries and Cannibals		#13 = Mind Reader Guy #14 = Position Paper	

MASC 351 Problem Solving Rubric

Solution Process

Understanding

3 - Evidence of understanding the problem and underlying concepts. Correct use of data and information

2 – Some gaps in understanding the problem or of relevant mathematical ideas

1 – Significant gaps or lack of understanding of the conditions of the problem or underlying mathematics

0 – Complete lack of understanding the problem

Approaches/Procedures/Strategies

3 – Efficient, workable approach, correct use of procedures and mathematical ideas, reasoned thought process that could lead to a solution

- 2 – Appropriate approach, but not completely implemented or applied; some gaps in use of procedures or strategies
- 1 – Unworkable approach or lack of direction and reason
- 0 – Incorrect procedures and reasoning

Presentation

Clarity

- 3 – Uses written and mathematical language effectively and accurately, clear and complete explanations and reasons for solution attempts and approaches
- 2 – Presentation is not completely clear; descriptions or diagrams are not always easy to read or understand. Unclear explanation of attempts or reasoning
- 1 – Little or no explanation of attempts or solutions (whether there is a correct answer or not); difficult to follow line of thinking
- 0 – No explanation or presentation

Completeness

- 3 – Presentation is complete; when appropriate includes both successful and unsuccessful attempts or reasoning, explains connections with other problems or mathematical ideas
- 2 – Some missing steps or explanations; some missing reasoning that leads to the solution; incomplete looking back at solution
- 1 – Significant important steps or explanations missing
- 0 – Incomplete steps, no explanation

Answer

- 2 – Complete and correct answer or answers
- 1 – Partially correct, or correct except for minor errors
- 0 – Incorrect or missing solution

Texas A & M University
Teaching, Learning and Culture
Concern/Opportunity/Acknowledgment Form (COAF)

Name _____ SSN: _____ - _____ - _____ Date ____/____/____

Address _____
Street City Zip

Telephone: Home (____) _____ - _____ Major _____
Work (____) _____ - _____ EMAIL _____

Class: _____

Circle Freshman Sophomore Junior Senior Graduate

Projected Graduation Semester _____ Year _____

Explain Opportunity/Concern/Acknowledgement (Please be specific with your narrative.)

If this is a concern what are the possible solutions?

a.

b.

Professor/Advisor/Mentor/Administrator Recommendation

_____ Date: ____/____/____
Advisor/Professor/Facilitator

Department Head Recommendation (denniesmith@tamu.edu)

Department Head /Designee _____ Date: ____/____/____
Dennie L. Smith, Department Head

Action/Follow-up:

Disposition Checklist 11/15/03; Revised 4/25/05

*The National Council for Accreditation of Teacher Education (NCATE) Standard 1 requires that teacher candidates exhibit professional dispositions. Students admitted to the Teacher Education Program must exhibit professionalism in their interactions with their peers, their instructors, and with teachers and students during coursework and field placements. Below is a checklist for instructors and cooperating teachers to use to note behavioral deficiencies. This form need not be completed if a student works satisfactorily. Completed forms will be kept on file. **Students: Sign and date after seeing the completed form. Instructors: Provide supporting evidence. Add comments on the back or attach a separate sheet(s).***

- A. Attendance and punctuality**
 - 1. Unacceptable absenteeism
 - 2. Frequently tardy or leaves early
 - 3. Rarely absent or tardy
 - 4. Perfect attendance
- B. Initiative**
 - 1. Passive, depends on others
 - 2. Has good ideas, works with limited supervision
 - 3. Creative and resourceful
 - 4. Demonstrates self-initiative and independence
- C. Work habits**
 - 1. Usually fails to complete assigned tasks
 - 2. Completed assignments turned in late
 - 3. Sometimes needs to be reminded of assignments
 - 4. Responsible, attends to syllabus, makes no excuses except under dire distress
- D. Oral communication skills**
 - 1. Makes frequent speaking errors
 - 2. Inarticulate, hesitates to express self
 - 3. Uses acceptable grammar
 - 4. Articulate, uses standard English grammar
- E. Written communication skills**
 - 1. Written work demonstrates frequent grammatical errors
 - 2. Writing is often unclear and unorganized
 - 3. Organizes and clearly expresses ideas
 - 4. Frequently and effectively communicates with others
- F. Critical thinking skills**
 - 1. Cannot analyze
 - 2. Struggles with initial analysis
 - 3. Poses thoughtful questions
 - 4. Distinguishes between relevant and irrelevant material
- G. Quality of work**
 - 1. Consistently hands in poor work
 - 2. Asks for help, then does nothing
 - 3. Completes the minimum required
 - 4. Reaches beyond the minimum and turns in excellent work
- H. Collegiality**
 - 1. Prefers to work alone
 - 2. Reluctant to work with others
 - 3. Works well on a team
 - 4. Freely shares ideas and materials
- I. Respect (in action and speech) in and out of the classroom**
 - 1. Creating classroom disruptions (such as cell phone ringing or rattling paper)
 - 2. Discusses inappropriate or personal topics
 - 3. Inappropriate remarks or actions
 - 4. Diplomatic, sensitive to others' needs
- J. Interactions with professors, field work personnel, and children – if applicable**
 - 1. Apathetic during field placement
 - 2. Often distracted during field placement
 - 3. Indifferent when talking with students or teachers
 - 4. Collaborates willingly with cooperating teacher during field placement
- K. Professional dress during fieldwork – if applicable**
 - 1. Always dresses inappropriately
 - 2. Sometimes dresses inappropriately
 - 3. Usually dresses professionally
 - 4. Always dresses professionally
- L. Attitude toward learners – if applicable**
 - 1. Lacks interest in subject content and/or learners
 - 2. Makes negative comments regarding subject content and/or some students
 - 3. Seeks help from cooperating teacher or instructor to increase understanding of content and/or to improve effectiveness of teaching
 - 4. Takes initiative and actively seeks assistance to learn content and/or instructional strategies to help learners attain higher order learning
- M. Commitment to excellence in teaching – if applicable**
 - 1. No attempt to implement suggestions for improvement, defensive
 - 2. Interested in teaching but displays little enthusiasm for improving ones own skills
 - 3. Applies suggestions from supervisors immediately
 - 4. Appears committed to teaching
- N. Appropriate attributes for morals, ethics and values for teaching**
 - 1. Exhibits behavior contrary to attributes
 - 2. Makes verbal comments contrary to professional attributes
 - 3. Responds to improvement to use positive attributes
 - 4. Exemplary evidence of attributes in behavior

Additional comments

The following are to guide your thinking as you comment about the student. You do not need to address each bulleted item.

- Positive attributes the student possesses related to teaching
- Impediments to the student's progress related to teaching:
- Has this student self-disclosed any disability that effects his or her disposition? If so, explain the disability and the specific needs of the student.
- Extenuating circumstances expressed by the student and relative to the student's coursework:
- Identify actions taken to remedy the situation. List any recommendations made to the student. Include appropriate dates.
- Recommendations to the Director of Field Placement regarding this student:
- Follow-up Recommendations Attached.

Date
Individual completing this form

Date
Student's signature acknowledges and understands the comments.