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EMAT 3410 – Mathematics Teaching & Curriculum Pre K-5
Spring 2006
Monday & Wednesday, 10:10am-12:05pm
Rm 102 Aderhold Hall

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Overview: This course will concentrate on decimals, geometry, measurement, probability, data analysis, and algebra. We will also work on translating the ideas about children’s mathematical thinking from EMAT 3400 to small group and whole class settings.

Objectives: The objectives of this class are for you to:

- Understand how children think about decimals, geometry, measurement, data/probability, algebra;
- Strengthen your own mathematics background in the areas of decimals, geometry, measurement, data/probability, algebra;
- Learn to make decisions about content selection and modification of instructional activities based on theories of mathematical learning and current educational reform efforts;
- Use knowledge of how children learn mathematics to plan appropriate instruction for small and large groups.
- Develop critical view of mathematics curriculum, textbooks, and other instructional materials
- Develop a repertoire of alternative (differential) instruction and assessment strategies to meet the intellectual and cultural needs of diverse students.
- Examine the nature of schooling, including teaching, grouping, testing, and policy issues, and its impact on the mathematics education of diverse students.

Required Course Materials: You are responsible for going to the Georgia Department of Education website (<http://www.georgiastandards.org/math.asp>) and printing a complete copy of the Georgia Performance Standards for Grades Kindergarten through 5 and the Executive Summary. I will send to you via email a copy of the Georgia Performance Standards organized by topic. (I will also make a hard copy available in case you have trouble receiving the email attachment.) You are responsible for getting your own printed copy of this

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document. I will provide photocopies of other articles or materials that we will read for class.

Attendance: Attendance and participation are essential in this class, both for you to learn and so that others may benefit from your input. Attendance is expected because most of class time will be spent on group discussions and activities. The ideas and concepts presented cannot easily be transmitted through class notes. You are responsible for all announcements made in class even if you are not there. It is important that you arrive promptly. Absences and tardiness will affect your professionalism grade. Any exceptions to attendance and punctuality should be discussed with me *in advance*.

Assignments: I will try to make the purpose of each assignment clear. If you have questions about the purpose of the assignment or what is expected of you, please ask. The requirements are due to me in person, or in my mailbox, by 5:00 pm on the due date listed in the syllabus. Late assignments will be assessed a penalty of 10% of the grade unless there are extenuating circumstances that are discussed with me *in advance*.

You are expected to demonstrate correct use of the English language with regard to grammar, punctuation, and spelling. I do grade on technical writing skills as well as content. Please proofread your work before turning it in to me. If you have weaknesses in the area of grammar, punctuation, or spelling, find someone who will proofread your work and/or use the capabilities of your word processor before you turn work in to me. It is expected that you will do your assignments on a word processor unless I indicate that an assignment may be handwritten. Any other exceptions must be cleared with me in advance. Assignments that are not typed will be returned without a grade.

Course grades will be based on total points earned, and a 90-80-70-60 scale will be used to assign final grades. Grades will be based on the following:

Assignments (see following pages)	205 points
<u>Professionalism</u>	<u>15 points</u>
TOTAL	220 points

Your grade for Professionalism will be based on arriving on time and being prepared for class (having read the assigned text), class participation (which includes both your contributions and your reactions to the contributions of others), your response to constructive feedback in the classroom and on written work, and exhibiting a professional demeanor (language, attitude) toward other. Written work, will be assessed on the quality of your writing as well as your interpretation and understanding of course content.

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University policies: All university policies with regard to withdrawals, early final exams, academic honesty, etc. will be strictly followed. It is your responsibility, to be familiar with these policies. All academic work must meet the standards contained in “A Culture of Honesty.” Each student is responsible to inform themselves about those standards before performing any academic work.

Tentative Schedule

Date	Topic	Assignment Due
Jan 9	Data Analysis & Probability	
Jan 11	Data Analysis & Probability	
Jan 16	No Class - MLK Day	
Jan 18	Data Analysis/Video	Probability Game Analysis
Jan 23	Decimal/Percents/Fractions	Video Analysis Due
Jan 25	Time & Money	
Jan 27	FIELD EXPERIENCE	
Jan 30	Time & Money	
Feb 1	Measurement	Time and Money Tasks
Feb 3	FIELD EXPERIENCE	
Feb 6	Measurement	
Feb 8	Measurement	Spaghetti & Meatballs
Feb 10	FIELD EXPERIENCE	
Feb 13 - Mar 10	FIELD EXPERIENCE	
Mar 13 - 17	SPRING BREAK	
Mar 20	Geometry	
Mar 22	Geometry	All 3 Field Assignments
Mar 27	Geometry	
Mar 29	Geometry	
Apr 3	Assessment	Geometry Tasks
Apr 5	Assessment	
Apr 10	Equity	Assignment Items
Apr 12	Textbooks & Curriculum	
Apr 17	Textbooks & Curriculum	
Apr 19	Algebra	
Apr 24	Algebra	
Apr 26	Algebra	
May 1	Algebra	
May 8	Final paper due in my mailbox in Aderhold 105 by noon	

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Assignment Overview

Assignment	Points	Date Due
1. Probability Game Analysis	25	
2. Data Analysis	25	
3. Time or Money tasks	25	
4. Spaghetti & Meatballs for All lesson plan	25	
5. All 3 Field Assignments	30 (10 each)	
6. Geometry items	25	
7. Assessment items	10	
8. Final Reflection	50	

Assignment Descriptions

PROBABILITY

Game analysis –

Analyze the following two dice games to determine if they are fair. Thoroughly explain how you determined if each game is fair or not.

- a) Game I: Roll 2 dice and record their sum. If the sum is odd, Player A scores a point. If their sum is even, Player B scores a point.
- b) Game II: Roll 2 dice and record their product. If the product is odd, Player A scores a point. If their product is even, Player B scores a point.

Describe how you would use these 2 games to teach a lesson to a class of fifth graders. I suggest you use the following format (example to be distributed in class):

TEACHER ACTION	TEACHER TALK	EXPECTED RESPONSE
Hold up one die.	Explain that you will roll the die, and if an even number comes up you get a point. If an odd number comes up, the class gets a point. Is this fair?	Yes; there are 6 numbers and 3 are even (2, 4, 6) and 3 are odd (1, 3, 5).

DATA ANALYSIS

For this assignment, you will investigate the classroom discourse that occurs in the classroom episode in the Lady Bugs tape. You may complete this assignment in groups of no more than four people. If you choose to work with a group, you should turn in one paper with all of your names on it, and you will all receive the same grade for the assignment.

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In your paper, you should describe and evaluate the manner in which the lesson meets the standards for teaching identified by the National Council of Teachers of Mathematics. I will distribute a copy of these standards in class. In addition, you should describe and evaluate the extent to which this is an equitable classroom.

TIME & MONEY

Find one activity for time and one activity for money. For each activity, modify the original activity so that the new one is more student-centered/more interactive and a higher cognitive level. Your new activity should address the same mathematical content as the original. In other words, if the original activity is about making change, the new activity should also be about making change. Explain why your new activity meets the criteria above. Finally, develop a list of 3-5 hints/scaffolds you would provide for students who are struggling with this new activity. The hints/scaffolds should be specific to the activity. In other words, do not say you will allow students to work in pairs as a scaffold.

MEASUREMENT

I will read the book *Spaghetti and Meatballs for All* by Marilyn Burns in class. Your task is to write a plan for a measurement lesson that includes this book. Your lesson should be prepared for a 3rd grade class of heterogeneously grouped students. Your lesson plan should be thorough enough that a substitute teacher could pick it up and implement it successfully. Instead of writing objectives for your lesson plan, include the following:

- What should students *know* at the end of this lesson? (e.g., facts, vocabulary)
- What should students *understand* at the end of this lesson? (e.g., concepts, ideas)
- What should students *be able to do* at the end of this lesson? (e.g., skills)

FIELD EXPERIENCE

During your field experience I hope that you will take advantage of every opportunity you have to observe mathematics being taught, to teach lessons yourself, to run math centers, and to assist individual children with mathematics. You will be asked to select 3 of the following 5 tasks to complete and turn in for a grade. It is important to begin thinking about and discussing these choices with your mentor teacher on your Friday visits. All 3 assignments will be due the week after you return from your field experience (November 7th).

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Option #1: Write a 500-word paper describing and critiquing the mathematical environment of your field experience classroom. Things on which you might comment include but are not limited to: visual displays in the classroom related to mathematic, learning materials available to students and how they are used, technology related to mathematics and how it is used, how students are grouped for mathematics instruction, how cooperation and competition are used during mathematics instruction, and when mathematics instruction takes place during the day. Compare and contrast this classroom environment with that of the classroom in which you interned in the fall.

Option #2: Teach a mathematics lesson (whole class, small group, center, calendar time). Turn in your written plan and a 500-word reflection on the lesson. In the reflection include responses to the following questions:

- Was this a teacher-centered or student-centered lesson? (Some parts of the lesson may have been teacher-centered while others were student-centered. Articulate where these changes occurred.) Provide evidence to support your answer. (What happened in the lesson that was teacher-centered or student-centered?) Why was the lesson this way? (What obstacles or opportunities did you have in planning an implementing this lesson?)
- What would you do differently if you could teach this lesson again...
 - a. In the same classroom?
 - b. In a different classroom?

Option #3: Write a case about a pedagogical dilemma you have or you see your mentor teacher have during mathematics instruction.

Option #4: Prepare an activity for students to do at home with their families. The activity should relate to a topic your teacher is addressing during mathematics instruction or a topic on which the students need additional work. If at all possible, you should actually send the activity home with children and encourage them to do it with their families. Then talk informally with children who have done the activity at home. Turn in a copy of the activity and write a 500-word paper on how and why you designed the activity and any student reactions you were able to gather.

Option #5: Read a children's literature book related to mathematics to your students. Use good instructional practices, such as reading with inflection, asking questions as you read, engaging students in predicting what will happen next, etc. Write a 500-word paper explaining why you selected the book, what mathematics you hoped to highlight, what happened during the discussion, and what you see as the value of using children's literature in mathematics.

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Option #6: Review student work from a particular lesson or activity. Provide copies of one piece of student work that shows a high level of understanding, one piece that shows a moderate level of understanding, and one piece that shows a low level on understanding. Explain how you selected these pieces of student work and why you classified them as you did. (Remove students' names from the work before turning it in.)

Option #7: Negotiate an alternative assignment with me if these assignments do not work in your field experience classroom or if you have a unique opportunity to do a different type of assignment.

GEOMETRY

Select 3 topics from K-5 geometry. Design a sequence of four activities/tasks for each topic (a total of 12 activities). Each sequence should show a clear progression in the knowledge, skills, and understanding needed to successfully complete the tasks. Describe each activity in narrative form in enough detail that a substitute teacher could conduct the activity successfully. If you adapt any activities from other sources (e.g., books, the web, articles), provide a citation for the original source.

ASSESSMENT

Go to the Georgia Department of Education web site and the section for released CRCT items (http://www.doe.k12.ga.us/curriculum/testing/crct_items.asp). Select 5 items and copy and pasted them into a word processing file. For each item, identify the mathematical idea that is being assessed and write an open-ended version of the problem to assess *the same idea*. Your items should reflect the characteristics of open-ended assessment that we discuss in class. In other word, do not simply take a multiple-choice computational item (such as $27 + 54$) and take away the choices to make it open-ended. You may not use items from the web site that I demonstrate in class for this assignment. You should make up your own assessment items. In addition, for one of the items that you develop you should create an assessment rubric that describes what work that does not meet standards would look like, what work that meets the standard would look like, and what work that exceeds the standards would look like.

FINAL REFLECTION PAPER

Consider your learning across MATH 5001, 5002, 5003, EMAT 3400, and 3410. (In other words, you are not restricted to what you have learned in this course.) Select one of the following ways to demonstrate what you have learned thus far:

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- Select an assignment from an EMAT or MATH course that you would do differently today than when you did it initially. Redo the assignment and describe how/why it is different from your first attempt.
- Select 2 assignments from EMAT or MATH courses that show a contrast in your thinking (mathematical or pedagogical). Describe the contrast and what might have led to the change.
- Select a topic or an issue in mathematics education that you disagree with, find confusing, have questions about, or are unsure how you feel about. Carefully and thoroughly articulate your views, making reference to materials, texts, or experiences from courses, as appropriate.