

Syllabus

MA 354 Methods and Materials in the Teaching of Middle School Mathematics

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Classroom and Meeting Time: WS 3806 Friday, 8 – 9:50 a.m.

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Goal/Purpose of the Course:

MA354 is designed for secondary and elementary mathematics education majors and will address the teaching of mathematics at the middle school level, grades 6 - 8. Various methodologies will be explored and the mathematics curriculum will be examined with attention given to the special needs and characteristics of the middle school student. In addition, there will be a great emphasis on the interaction between content and pedagogy and on problem solving and activity-based learning.

Objectives:

1. Examine the new middle school curriculum as expressed in the *NCTM Principles and Standards for School Mathematics* and the Michigan Curriculum Frameworks.
2. Develop methods for teaching problem solving strategies and model investigative techniques.
3. Explore verbal, concrete, pictorial, graphical and algebraic models as communicating mathematics.
4. Experience activities and problems that model the development of number sense.
5. Examine real numbers and various operations, with emphasis on mental computation and estimation.
6. Develop meaningful ways to use calculators and computers.
7. Explore the integration of geometry into the middle school curriculum.
8. Explore concrete lab activities using the tools of measurement and measurement systems.
9. Examine the role of various manipulatives in the teaching of middle school mathematics.
10. Explore the use of patterns and functions in middle school mathematics.
11. Examine algebra readiness activities and the role of algebra in middle school.
12. Through the field experience, examine the special needs of middle school students including motivation, diagnosis, remediation and acceleration.
13. Develop effective classroom management and planning techniques and explore a model for structured group work.

Requirements:

1. Attendance is absolutely necessary. If you must miss class due to illness or other emergency, you are responsible for calling or emailing me - and keeping up with the assignments. (I expect the assignment that is due that week to be into my office by Friday.) I will gladly e-mail the next week's assignment to you. One or more unexcused absences may result in a grade of "F" for the course.
2. You will sign up for 10 classroom visits at Bothwell Middle School, each time observing a complete math session. The teacher may have you assist individual students or work with groups of students. (I encourage you to get actively involved in the classroom right away!)

You are to record the dates and times of your visits on the form provided and have the teacher initial the log each time. So that you have additional experience prior to student teaching, I want you to teach at least one lesson at BMS. I expect you to work with the classroom teacher to coordinate the time and subject matter that best fits into the classroom schedule. You need to allow plenty of lead time in order to prepare a lesson plan and turn it in for a grade before you teach (50 pts). I will grade it and return it to you for revision before the lesson. If possible, I will come to observe your lesson. **I require a final lesson plan** (this may result in improved scores for the LP) **for both the teacher and me that includes all the components cited in the “Lesson Plan Assignment(s)” located at the end of the syllabus.** I also expect you to write a reflection on the lesson you conducted in the classroom (25 pts). This will be your journal entry for that day.

3. You will teach a short lesson to the class which will be video-taped. It may be similar to the lesson taught at Bothwell or another lesson. It will be less than 15 minutes to accommodate 20 people having to do them. Scoring will be done using a rubric worth 10 points, but the activity will be worth 25 points.
4. You must keep a journal of your middle school classroom experiences. I'm providing you with a general guideline for the first visit (see end of syllabus). It will count for 25 points. I will collect these journals around mid-term and again at the end of the semester to peruse your entries. The journal itself is also worth 25 points.
5. You will be required to do 2 projects for this course. The requirements are as follows:
 - a. You will devise 5 problems using the metric system for middle school students to solve. The problems will involve (first) estimating, for example, the volume of a solid and then finding (second) the actual volume. The 5 problems will each represent a different type of measurement. (20 pts)
 - b. You will be organized into groups of 4 people and this project will consist of developing learning centers appropriate for middle school students. It will be your responsibility to select a "theme" or topic and then make sure that the four learning centers developed by your group all reflect that theme (or topic). You will submit a main lesson plan, in the format as described below, and include an activity page for each center. You should design the centers so that each activity can be done in approximately 15 minutes. For our class time one or two weeks in April, our class will be your "students" and we will rotate through the centers just as the middle school students would. (50 pts)

The lesson plan format should contain:

 - The Michigan Curriculum Frameworks Standards/Benchmarks addressed by the lesson;
 - Learning goals/objective(s) of the entire lesson with short objectives for each center;
 - Prerequisite skills needed;
 - Outline of each activity and activity worksheets, as appropriate;
 - Description of how each activity will be assessed.

You will write a reflection on your center and turn it in to me at the next class period.

6. You will be required to do outside readings, middle school textbook analyses, and spend time exploring software appropriate for these grade levels. We may also have some in-class

assignments based on the use of various manipulatives. Written assignments are typically worth 5-15 points each and will be collected at the next class meeting. Only in cases of emergency will assignments be accepted one day late without penalty. After that time, points will be taken off systematically.

Text: *Teaching and Learning Middle Grades Mathematics* by R. Rubenstein, C. Beckmann and D. Thompson

In addition to the text, NCTM Standards, and Math Framework, other activities and problems will be explored so that our goals are achieved.

Grading: This course is graded on an A-F basis. Your grade will be calculated by taking the ratio of points you have earned to the total possible (in percent form). My grading scale is:
A = 93-100%; A- = 90-92%; B+ = 87-89%; B = 83-86%; B- = 80-82%; C+ = 77-79%;
C = 73-76%; C- = 70-72%; D+ = 67-69%; D = 63-66%; D- = 60-62% F: < 60%

Note 1: Take advantage of my office time to seek help and/or resources as needed.

Note 2: If you have a need for disability-related accommodations or services, please inform the Coordinator of Disability Services in the Disability Services Office at 2001 C. B. Hedgcock (227-1700; TTY 227-1543). Reasonable and effective accommodations and services will be provided to students if requests are made in a timely manner, with appropriate documentation, in accordance with federal, state and University guidelines.

Note 3: Our final exam time is Friday, May 4, at 8:00 – 9:50 am.

Lesson Plan Assignment(s)

You are not expected to re-invent the wheel. Feel free to make use of resources for planning your lesson. However, provide references for resources you have used. Also, **do not assume** that, because a lesson plan is on the web (or anywhere else), it is necessarily a lesson plan that reflects the NCTM *Standards*—even if it claims to. Your goal is to *design* lessons that conform to the NCTM *Standards*. That is on what you will be graded. (Using references does NOT mean copying others' lesson plans. You may get *ideas* for lessons but the plan is to be designed by *you*.)

You may use any lesson plan format but it must include (& I must be able to identify) the following (order is not important):

- What are your mathematical goals?
These should be **learning** goals—indicate what the students will (hopefully) **understand** after the lesson that they did not before. Learning goals refer to mathematical *concepts*; they are not what the students will *do*, they are not “able to do” goals. I.e., **not** “They will solve problems.” **not** “They will measure shapes.” **not** “They will be able to add two digit numbers.” etc. “Students will be able to” goals may be included (in fact, are highly appropriate) but must not be the only type of goal you list. The “able to do” goals should help students meet the “understanding” goals. It would not hurt to look at the early parts of whatever chapter in our text relates to the content of your lessons. Also, students often write goals such as “students will understand how to ...” This is really a procedural goal (how to do something is following a procedure) with the word “understand” thrown in. It is not what I’m looking for.
- What will the teacher do? What will the teacher say? What will the teacher ask?
 - Don’t say things like, “The teacher will explain the concept.” This is completely generic & does not tell me what you are thinking.
 - Don’t say, “We will discuss ...” This too is generic & does not tell me what you are thinking. If you will have a discussion, give examples of what you would say/ask & what you would expect of students in response. Why are you discussing? What ideas do you intend the discussion to elicit?
 - Don’t say, “I will ask the students if they understand.” Think about yourself as a student when teachers ask this question; few students willingly admit they do not understand—esp. when the rest of the class answers that they do. However, it is important to be able to discern if the students *do* understand. How you do so should appear in the assessment section of the plan.
 - If, say, your lesson is about geometry, don’t say, “I will present shapes.” Be explicit about what shapes you will present, in what order, and why these shapes & that order. Provide copies/diagrams of each of the shapes exactly as you will provide them. This is part of planning.
- What will the students do? (If the lesson has multiple parts, you should provide this information for each part.)
 - Will they be in their desks, at the board, writing, drawing, etc?
 - Will they be using manipulatives? How will they obtain them? How will they be introduced to them (if this is a first experience with them)?
 - Will they work individually? Pairs? Groups? Whole class?
- How will you “wrap up” the lesson? This should be more than just thanks, good job. It should be more than just what did you learn. The closure should help the students put together the ideas brought out in the lesson. Note: the teacher should not be the one putting the ideas together. The goal would be to have questions that help students put the mathematical ideas together. E.g., “When we made all the rectangles with 24 square tiles, what did you notice about the relationship between the shape of the rectangle and the perimeter?”
- What is the mathematics available from the activity?
What areas of math does the lesson address?—recall our in-class conversations about math in (a) our in-class activities, (b) various lessons the class has been observing, & (c) the NCTM *Standards* & MI *Frameworks*. This is to be much more specific than, say, “Geometry.” or “Measurement.” or “Area & perimeter.”
- How will you assess your students?
Make sure you include information on how you will assess students. This does NOT need to be a worksheet but you must be clear about how you will tell if students are meeting your learning goals (i.e., the assessment and goals should be related). [Completing a worksheet in & of itself is not such an indicator. I am sure many of you have done worksheets without having understood the concepts—I know I have.]

- If you will use any worksheets, include them with the LP(s) you turn in.
- Approximate time for each part of the lesson. How long will the intro take? Explaining the activity or problem? How long will you give students to work? Passing out materials? Etc.
- What materials do you need to have or prepare before the lesson?
- Any other info you deem important & necessary.

First Class Observation Questions

These are both an assignment and a set of guidelines for helping you learn from observations. They should help you focus and think like a student of teaching. You do not need to answer each specific question in each numbered item. However, I will be looking for a sense that you have thought carefully about each of the numbered items. An important part of your response is the *evidence* you use to *support* your statements.

1. What was the atmosphere in the classroom the moment you arrived? Did the students seem happy? Tense? Comfortable? Other? There may not be one atmosphere that you feel prevails over the whole room. The atmosphere may change across the time you are there. Try to note all this. What **evidence** supports your observations—provide examples of behaviors that made you think this.
2. How would you describe the room? Is there evidence of mathematical activities? Note arrangement of student tables/desks. What is on the walls, chalkboard, etc? What posters, if any, are up? Etc. What role (if any) does the classroom environment seem to play in the students' learning?
3. What is your impression of the students' attitudes about math? Not all students may fit any particular category—try to get a sense of where *all* the students are attitudinally. What **evidence** supports your observations?
4. Consider the math lesson itself. What did the teacher do? What did the students do? {These should be more than “teach” & “learn.” Did the teacher do examples? Did s/he give the students a “big” problem to work on in groups? Did s/he do all the talking? Did students talk—about math—with their peers or did they only answer the teacher's questions? Were their answers limited to one word or number or did they describe *how* they solved problems? Etc.) Think in terms of the NCTM Process Standards.
5. What was the mathematical content? Be more specific than, say, “Geometry” or even, “triangles.” What math could the students learn? Think in terms of the NCTM Content Standards.
6. What did this experience start/continue you thinking about teaching?
7. What questions about teaching did the observation trigger for you? Did the teacher do anything that (surprised, pleased, disturbed, ...) you? Why do you think s/he did that? What might s/he have done instead? (or) How might you have (re)acted in her/his place? Etc.