

# **MATH 3520: Teaching Elementary School Mathematics**

FALL 2011

Tuesday & Thursday 11:00 a.m. – 12:15 p.m. and 12:30 – 1:45 p.m.

**Instructor:** Dr. Kate Kline, Course Coordinator      **Office:** 4426 Everett Tower  
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**Office Hours:** Tuesday 2:00 p.m. to 3:00 p.m., and by appointment at other times.

## **COURSE DESCRIPTION**

This course is designed to give prospective elementary teachers an understanding of what it takes to teach mathematics successfully to children. It is extremely challenging to teach mathematics well and we will be working on several aspects of what it takes to do this. First, it is important that you understand the content well that you will be teaching to children. Beyond understanding the content, you must also have the wherewithal to anticipate the ways children might think about the content and the kinds of strategies they might use to solve various problems. As a teacher, how do you make decisions about how to help students who are struggling with the material? What will support them to gain an understanding of what they are learning so that they will have the confidence to move forward? How do you make decisions about how to extend students who might have a solid understanding of the material at hand? And perhaps one of the most critical questions is how you determine whether a child has a solid understanding of mathematics in the first place.

All of these decisions impact what teachers do in the classroom to create an environment where students are challenged to think, to learn mathematics with understanding (rather than rote memorization), and to make connections among mathematical ideas. You will be challenged to think about how the culture you set in the classroom shapes what students will do to learn mathematics and what they will learn to value. We will focus on what kinds of lessons produce what kinds of thinking and work on developing your own lessons to promote understanding.

The focus of this course will be on **knowing mathematics for teaching**. What does that entail? First, you will consider what is important for your students to learn. In other words, what kinds of understanding, skill, and practices do you want to develop in your students? Second, you will think about what it is you need to know in order to support their learning. Teaching depends on particular kinds of mathematical understanding and skill different from what it takes to do well in a math course as a student yourself. In preparing to teach, a teacher should prepare mathematically for what might happen as a lesson unfolds, prepare good questions to elicit thinking, and think carefully about the amount and kind of information you provide to students to support their work.

We will focus this semester, then, on developing mathematical knowledge that is useful in teaching. Our focus on the *mathematical content* will be on number work, particularly whole numbers and fractions, with some work on other topics. Within these topics, we will also work on *mathematical teaching practices*, focusing on what teachers must do to support their students' understanding. These foci have been selected because they are central to so much of the elementary school curriculum and because teaching them well is not easy.

This is a laboratory-oriented course where you will experience many different activities for teaching children. You will learn from doing the activities what you cannot possibly learn from reading about them or copying notes from another student in class. Therefore, attendance is essential. [See attendance policy on the next page.] A semester is also a short time to learn about these complex ideas about teaching mathematics. However, if you work hard and attentively this term, you will learn mathematics for teaching. You will develop skills of watching and listening that enable you to make sense of how others think mathematically and express themselves in multiple ways. You will develop practices that enable you to create a classroom environment for learning mathematics, to attend and respond to students' mathematical ideas and ways of thinking, and to plan, teach and analyze mathematics lessons. You will have enhanced your knowledge of mathematics in ways that will prepare you for the specific work of teaching. By the end of the semester, you should have developed an understanding of the process required to continue to learn how to teach so that you can continue to grow throughout your career.

**Required Course Materials** (available at the bookstore in Bernhard – purchase before 2<sup>nd</sup> class)

- Coursepack for Math 3520 (Kline) available at the Bernhard bookstore only

**IF THE BOOKSTORE DOES NOT HAVE COPIES READY, YOU MUST:**

- (1) Fill out an MTO (Made To Order) form at the Information Desk of the bookstore,
- (2) PAY for the order at that time, and then (3) pick it up after 10:00 a.m. the next day.

**Course Prerequisites**

- Completion of Math 1500, 1510 and 2650 with **grades of C or better** is required. Those not meeting the course prerequisites will be **automatically dropped** from the course by the Mathematics Department. Finally, if you are pursuing the Elementary Mathematics Minor, you must maintain a grade of B or better in all courses leading to Math 5540 and 5550.
- YOU MUST HAVE BEEN ADMITTED TO THE ELEMENTARY EDUCATION PROGRAM.

In addition, it is highly recommended that you do not take this course until after you have taken educational psychology (either ED 3090 or ED 3100).

**Writing Assignments:**

You will be given writing assignments on classroom videos, class activities, and readings from the syllabus to complete individually. These writing assignments will allow you to reflect on the major ideas from class and the readings, make important connections across readings and class activities and videos, and demonstrate careful and thoughtful analysis of the readings and classroom videos.

**Course Projects:**

The two course projects will give you the opportunity to work with peers to experience the kinds of activities necessary for developing your ability to teach mathematics effectively. In the first project, you will implement and analyze a task-based interview with an elementary student to explore the range of important mathematical ideas relevant to number and operations. The second project will require you to work on lesson plan(s) from various textbooks. More detailed descriptions of each project will be provided separately.

## **Class Participation:**

Class participation is absolutely critical to get the most out of the activities we do and discussions we have in class. As you work on formulating your personal philosophy about teaching mathematics, it is imperative that you consider ideas other than your own and weigh the advantages and disadvantages of specific instructional approaches. Therefore, I will make an effort to elicit various beliefs about teaching so that as a group we can consider each option. Please understand that I may challenge ideas offered in class in order to encourage everyone to think more deeply about what we are discussing. By the end of the semester, your ideas about teaching will be informed by perspectives from other students, from mathematics educators, from authors of articles and case studies, and from watching real students in real classrooms. The extent to which you participate during small group time (and take advantage of this time to work through ideas), as well as participate during whole group time, will impact your ability to formulate a well-grounded philosophy about teaching mathematics.

**Productive/unproductive participation in class will be considered in determining final grades for students on the border between two grades.**

## **Course Notebook:**

Students typically have difficulty taking notes in this class, and so we have specific suggestions for how to organize your ideas from this course so that they will be useful to you when doing assignments and preparing for exams, as well as for when you begin to teach. Notebooks will not be collected or graded, but should include the following different types of entries:

### **In-Class Notes:**

These should capture what we do in class by listing activities, drawing any representations we discuss, and jotting down ideas that are discussed. After every class you should also set aside about 5 minutes to re-read your class notes, and fill in the gaps in order to ensure that they make sense at a later date.

### **Post-Class Notes:**

These should include the following: 1) **a summary of the important issues/points from class**; and 2) **your reactions to these points** where you discuss which ideas/issues surprised you, which ideas you are continuing to think about and in what way, and 3) **what connections you are noticing across classes and to the NCTM Professional Teaching Standards**, and which ideas you would still like to learn more about.

### **Reading Notes:**

For every individual reading that is assigned, your reading notes should include: 1) **a summary of important ideas/arguments made in the reading**, 2) **your reactions to these ideas/arguments**, where you discuss which ideas/issues you agree with, and which ideas you are questioning and in what way, and 3) **what connections you are noticing, specifically considering connections to class and connections to the NCTM Professional Teaching Standards**. These notes will be critical for engaging in more productive classroom discussions and in preparing for the midterm and final exams. Please keep up to date on your reading and reading notes.

## COURSE REQUIREMENTS AND GRADING POLICY

The following is a tentative outline of the required graded assignments and their weights:

- Midterm  $\approx 20\%$  of final grade
- Comprehensive final  $\approx 27\%$  of final grade
- Writing Assignments  $\approx 24\%$  of final grade
- Two Course Projects  $\approx 29\%$  of final grade

**IF ALL** course requirements have been met, grades will be assigned according to the scale:

A	Outstanding, exceptional, extraordinary	93% – 100%
BA		88% – 92%
B	Very Good, High pass	82% – 87%
CB		77% – 81%
C	Satisfactory, acceptable, adequate	71% – 76%
DC		66% – 70%
D	Poor	60% – 65%
E	Failing	Below 60%

**NOTES:** You must attain at least a C (71% or higher) in this course in order to take the Math & Science Practicum (ED402). In order to pursue the Elementary Mathematics Minor, you must attain at least a B (82% or higher) in all elementary mathematics courses.

The exams will cover the content of class discussions and assigned readings. [Not all the things discussed in class will be in the readings, and not all readings will be discussed in class.] **No make-up exams** will be given. **NOTE: the last exam is during Finals Week.** The assignments will be either handed out in class or posted on e-learning and must be turned in by the specified due date (and time). **No late assignments will be accepted.** If you are absent the day an assignment is due, you are still required to submit the assignment on time (either by e-mail, or by arranging to have it brought in by a classmate). *If you submit via e-mail, you must keep your original e-mail with the date on it in your sent folder until I reply letting you know I have received it.*

### **Attendance Policy:**

This is a laboratory-oriented course where you will experience many different activities for teaching children. You will learn from doing and discussing the activities what you cannot possibly learn from reading about them or from copying notes from another student in class. Therefore attendance and participation are essential. Not only do excessive absences suggest a lack of professionalism and commitment, but they guarantee that you will not attain the objectives of this course. **Your final grade will be lowered by one letter if you have more than two absences, excused or unexcused. If you have excessive absences (more than 4 for the semester), you will not receive higher than a grade of C regardless of your performance on assignments and exams.** Attendance will be taken at the beginning of class. If you are late, it is your responsibility to notify the instructor (after class) of your presence. [Each late arrival or early leave will count as half an absence if you are late/leave early more than twice.]

## **WHEN YOU MISS CLASS—IT IS YOUR RESPONSIBILITY TO:**

- 1) let me know via email **before** the missed section, if at all possible;
- 2) obtain the notes and handouts for missed class from another student in class;
- 3) reflect on these notes;
- 4) read the required readings before the next class;
- 5) after you have reviewed all of the material above and you still have questions, make an appointment with me to discuss.

### **Policy on Electronic Devices:**

**\*\*\*\*\*All radio devices (cell phones, i-Pods, MP3 players, laptops, etc.) must be turned OFF during class as well as during exams and kept OUT OF SIGHT. Since this is a laboratory-oriented course, where we often do activities and have discussions in small groups, it is unprofessional and disrespectful to others in your group to be distracted by your phone. \*\*\*\*\***

### **Policy on Incompletes:**

Three conditions must be met for an incomplete:

- (1) you must have completed most of the coursework;
- (2) your current grade is DC or better; and
- (3) circumstances beyond your control prevent the completion of the coursework on time.

*All incomplete grades must be approved by the Chair of the Mathematics Department.*

### **Accommodations Policy:**

Any student with a documented disability (e.g., physical, learning, psychiatric, vision, hearing, etc.) who needs to arrange reasonable accommodations must contact the professor and the appropriate Disability Services office at the beginning of the semester. If you believe you need some type of accommodation due to a disability, contact the Disabled Student Resources and Services office, (269) 387-2116; <http://www.wmich.edu/disabilityservices>.

### **E-mail Policy:**

The only email address that I will use to communicate with you is the one associated with a BroncoNet ID. [Typical form firstname.lastname@wmich.edu.] You can access this email account or get instructions for obtaining a BroncoNet ID at [GoWMU.wmich.edu](http://GoWMU.wmich.edu).

### **Academic Integrity:**

You are responsible for making yourself aware of and understanding the policies and procedures in the Undergraduate and Graduate Catalogs that pertain to Academic Honesty. These policies include cheating, fabrication, falsification and forgery, multiple submission, plagiarism, complicity and computer misuse. [The policies can be found at [www.wmich.edu/catalog](http://www.wmich.edu/catalog) under Academic Policies, Student Rights and Responsibilities.] If there is reason to believe you have been involved in academic dishonesty, you will be referred to the Office of Student Conduct. You will be given the opportunity to review the charge(s). If you believe you are not responsible, you will have the opportunity for a hearing. You should consult with me if you are uncertain about an issue of academic honesty prior to the submission of an assignment or test. Further, you are encouraged to visit [www.wmich.edu/conduct](http://www.wmich.edu/conduct) and [www.wmich.edu/registrar](http://www.wmich.edu/registrar) to access the Code of Honor and general academic policies on such issues as diversity, religious observance, student disabilities, etc.

## FALL 2011 Tentative Schedule

DATE	TOPIC	READINGS (to be read <u>before</u> this class)	Tentative Assessments
Sep. 6	Teaching for Understanding		Sign up for 120-Day Free Access to NCTM ( <a href="http://www.nctm.org">www.nctm.org</a> )
8	Teaching for Understanding & Analyzing Teaching	<b>Coursepack, p. 4-19</b> <i>Teaching Mathematics in the Era of the NCTM Standards</i> <i>NCTM Professional Standards</i>	
13	Teaching Mathematics for Understanding	<b>Coursepack, p. 20-29</b> <i>Using Your Own Teaching as a Site for Research into Practice</i>	
15	Number Concepts & Counting		<b>Writing #1 Analyzing Teaching Paper DUE</b>
20	Issues in Counting & Lesson Analysis	<b>Coursepack, p. 30-45</b> <i>Counting Cases</i>	
22	From Counting to Addition	<b>Coursepack, p. 59-65</b> <i>Making the Most of Story Problems</i>	
27	Meaning of $\times$ / $\div$	<b>Coursepack, p. 46-58</b> <i>Modeling the Operations Cases</i>	
29	Fluency & The Basic Facts		<b>Writing #2 Creating Dialogue Paper DUE</b>
Oct. 4	Classroom Activities for Developing Fluency	<b>Coursepack, p. 66-71</b> <i>The Road to Fluency and the License to Think</i>	
6	Classroom Activities for Developing Fluency	<b>Coursepack, p. 72-76</b> <i>Focused Instruction on Quick Images</i> <i>Fluency with Basic Addition (handout)</i>	
11	Whole Number Computation	<b>Coursepack, p. 77-84</b> <i>Multiplication Fact Fluency Using Doubles</i>	
13	Interviewing Children	<b>Revisit Coursepack, p. 59-65</b> <i>Making the Most of Story Problems</i>	<b>Interview Preparation DUE</b>
18	<b>MIDTERM</b>		
20	Whole Number Computation	<b>Coursepack, p. 85-94</b> <i>Lynn's Cases</i>	
25	Whole Number Computation	<b>Coursepack, p. 95-100</b> <i>Harmful Effects of Algorithms</i>	
27	Whole Number Computation (Alternative Algorithms)		

<b>DATE</b>	<b>TOPIC</b>	<b>READINGS (to be read <u>before</u> this class)</b>	<b>Tentative Assessments</b>
<b>Nov. 1</b>	Exploring Representations (Base-Ten Blocks)		<b>Interview Report DUE</b>
<b>3</b>	Representations/ Manipulatives (Fractions)	<b>standards.nctm.org PSSM document</b> Grades 3-5: Representation Standard	
<b>8</b>	Manipulatives (Fractions)	<b>Coursepack, p. 101-117</b> <i>Understanding Fraction Equivalence and Order</i>	
<b>10</b>	Lesson Planning Analyzing Tasks/Lesson Formats		<b>Writing #3 Paper DUE</b>
<b>15</b>	Lesson Planning Creating New Tasks/ Questions	<b>Coursepack, p. 127-152</b> <i>Teaching Through Problem Solving</i>	
<b>17</b>	Lesson Planning Whole Group Discussion	<b>Coursepack, p. 118-126</b> <i>Orchestrating Discussions</i>	
<b>22</b>	Lesson Planning Launch & Closure		
<b>24</b>	<b>No Class—Thanksgiving</b>		
<b>29</b>	Assessing Student Thinking	<b>Coursepack, p. 153-169</b> <i>Building Assessment into Instruction</i>	
<b>Dec. 1</b>	Assessment Practices and Challenges		<b>Lesson Plan DUE</b>
<b>6</b>	Creating a Learning Environment	<b>Coursepack p. 170-177</b> <i>Learning to Think &amp; Thinking to Learn</i> <b>Coursepack p. 178-185</b> <i>Establishing a Community of Mathematical Learners</i>	
<b>8</b>	Planning to Teach		
<p><b>Mon. Dec. 12</b>      <b>8:00 – 10:00 a.m.</b> (11 a.m. class)</p> <p><b>Wed. Dec. 14</b>      <b>12:30 – 2:30 p.m.</b> (12:30 class)      (using Tues. 1:00 exam time)</p> <p style="text-align: center;"><b>FINAL EXAM</b></p>			