Methods and curriculum for teaching mathematics in grades 1-6. Emphasis on whole numbers, computational strategies, algebraic thinking, geometry, and problem solving. Prereq: jr st; admis to the School of Educ; & Math 176 (C or better).

This course includes content related to the knowledge and skill indicators for the MCEA program as noted on the last page of this syllabus.

**Course Objectives**

Students will:

1. Demonstrate familiarity with national and Common Core standards for mathematics.
2. Develop mathematical knowledge for teaching (MKT) and pedagogical content knowledge (PCK) in the strands of number, operations, algebraic reasoning, geometric thinking, and math processes.
3. Utilize problem-solving approaches to planning and teaching mathematics.
4. Gain skill in using formative assessment practices through analysis of student mathematical work and performances to plan appropriate instruction.
5. Select, plan, adapt, implement and evaluate instructional activities and lessons with elementary students that emphasize mathematical problem solving, reasoning, and communication as a basis for the development of mathematical content knowledge and skills.
6. Use the MCEA Reflective Writing Framework to engage in reflection and evaluation of your own teaching of mathematics and subsequent student learning.
Required Course Readings


- Common Core State Standards for Mathematics, pgs. 1-38 and pgs. 85-90. Download and print pgs. 1-38 and pgs. 85-90 and bring with you to all class sessions. This document is accessible via D2L or at http://www.corestandards.org/the-standards/mathematics

- Selected articles, handouts, and websites. You must utilize D2L to download and print articles and handouts from D2L and from specific web sites (links will be provided via e-mail or in-class). The list of articles is detailed below.

Reference List of Required Article Readings and Additional Optional Readings


Heibert, James, et.al. (1997) Making Sense: Teaching and Learning Mathematics with Understanding, Heinemann, Portsmouth, NH, 1-16.


1. **Students with disabilities.** If you will need accommodations in order to meet any of the requirements of this course, please schedule an appointment with the instructor by the second week of class. Verification of disability, class standards, the policy on the use of alternate materials and test accommodations can be found at the following: http://www.uwm.edu/Dept/DSAD/SAC/SACltr.pdf

2. **Religious observances.** Policies regarding accommodations for absences due to religious observance are found at the following: http://www.uwm.edu/Dept/SecU/acad%2Badmin_policies/S1.5.htm

3. **Students called to active military duty.** Accommodations for absences due to call-up of reserves to active military duty should be noted. http://www3.uwm.edu/des/web/registration/militarycallup.cfm

4. **Incompletes.** The conditions for awarding an incomplete to graduate and undergraduate students can be found at the following: http://www.uwm.edu/Dept/SecU/acad%2Badmin_policies/S31.pdf

5. **Discriminatory conduct (such as sexual harassment).** Definitions of discrimination. Harassment, abuse of power, and the reporting requirements of discriminatory conduct are found at the following: http://www.uwm.edu/Dept/SecU/acad%2Badmin_policies/S47.pdf

6. **Academic misconduct.** The university has a responsibility to promote academic honesty and integrity and to deal effectively with instances of academic dishonesty. Policies for addressing students cheating on exams or plagiarism can be found at the following: http://www.uwm.edu/Dept/OSL/DOS/conduct.html

7. **Complaint procedures.** Students may direct complaints to the department chair in which the complaint occurs. If the complaint allegedly violates a specific university policy, it may be directed to the department chair in which the complaint occurred or to the appropriate university office responsible for enforcing the policy.

8. **Grade appeal procedures.** Procedures for student grade appeal appear at the following: http://www.uwm.edu/Dept/SecU/acad%2Badmin_policies/S28.htm

9. **Final examination policy.** Policies regarding final examinations can be found at the following: http://www.uwm.edu/Dept/SecU/acad%2Badmin_policies/S22.htm
Policies, Procedures, and Requirements Specific to This Class

This is a highly participatory class. A demonstration of productive, supportive, and professional interactions, in both large and small cooperative groups, is important to your learning and success in this course.

General Course Expectations: As a developing teacher of mathematics, you are expected to:
• Conduct yourself in a professional and collaborative manner during each class session. This includes refraining from texting during class.
• Be well-prepared for each class session by completing all assigned readings and tasks prior to each class.
• Use your assigned UWM email account regularly for course information and instructor communication.
• Communicate, in a proactive and timely manner, with your instructor any issues that arise in the field that may impact the quality of your assignments.
• Devote numerous hours to professional reading (assigned readings) to establish a knowledge base for teaching mathematics.

Attendance: Attendance is required and includes being on time for every class and staying for the entire class. The instructor will adjust your grade if your attendance is not maintained. If you miss up to two classes, a third of your grade will be deducted from your final grade (e.g., an A- will become B+, a B will become a B-, etc.). A whole grade will be deducted for three missed classes. More than three absences will require a meeting with the instructor. A pattern of late arrivals or early departures will negatively impact the class attendance component of your grade and will be handled on a case by case basis. Unusual or emergency circumstances will also be handled on a case by case basis. Provide written confirmation of excused absences (e.g., medical, emergency, illness, death, etc.). It is necessary to contact the instructor prior to class if you are unable to attend. Verbal excuses will not be documented and thus will not be considered. Any unexcused absence will result in a loss towards the attendance portion of your grade.

Make arrangements with a class member to collect handouts and to share notes. Each assignment is due on the designated due date, even if you are absent. You are responsible for in-class work and readings when you are absent. Three instances of tardiness/early departure will be considered equivalent to one absence.

Assignments:
All assignments should be word processed unless otherwise stated in the syllabus or in class. Each assignment should be presented in a neat, organized, and clear manner. The body of all papers should be typed using Arial 12 or Calibri 12 and double-spaced. Keep a copy (hard copy or disk copy) of assignments for your record keeping purposes in case questions or discrepancies arise. All assignments are due on the designated due date whether or not you attend class. All assignments are due at the beginning of class. If you are absent, you must submit the assignment by the beginning of the class session (via email or in the instructor’s university mailbox). For late assignments, the grade or assigned points/percentage will be lowered for each day that the assignment is late. No extra credit assignments will be granted or re-write of assignments allowed.
**FINAL GRADE COMPONENTS**
The following components and weights will be used in determining your grade for this course. Please carefully read the detailed description of each grade component below.

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<thead>
<tr>
<th>Graded Component</th>
<th>Percent of Grade</th>
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<tbody>
<tr>
<td>Class Attendance</td>
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<td>In Class Tasks</td>
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<tr>
<td>Collection of Mathematics Experiences</td>
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<td>Instructional Unit Report</td>
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<td>Final Exam</td>
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Grades will be assigned on the following scale:

- **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** 0-59

**Class Attendance (15%)**
Attendance is vital to achieving the goals of this course. You are expected to attend all class sessions and are expected to arrive on time and stay the entire class session. Excused absences must be documented through written verification, such as not from a doctor’s office or an obituary/funeral program. Verbal or email excuses for absences are not documented and thus will not be considered. Any unexcused absence will result in a loss towards the attendance and in-class tasks portion of your grade as follows:
- No absences (nor late arrivals or early departures), receive the maximum 15%
- 1 unexcused absence, maximum 10%
- 2 unexcused absences, maximum 5%
- 3 or more unexcused absences, no attendance points

If you establish a pattern of tardiness/early departure in class, your final grade will be impacted. Three instances of tardiness/early departure will be considered equivalent to one absence.

**In Class Tasks (10%)**
**Due: On the day it is assigned in the syllabus.**
You are expected to participate in discussions, small group, and individual work in a professional manner that contributes to the engagement and learning of all class members toward course goals. Class experiences provide the opportunity to participate in dialogue that is crucial to the learning process. The reflection on what others share is an important aspect to your learning in this course. You are expected to contribute to complete in-class tasks, such as written reflections, mathematical tasks, and analysis of student work or video segments.
Collection of Mathematics Experiences (30%)
**Due: On the day it is assigned in the syllabus**
These are due at the **beginning** of each class period and typed unless otherwise noted. If you are missing class, you may email homework to the instructor prior to the class session to receive full credit for it. There may be a need during the course of this semester to modify course assignments and assessments as well as due dates.

Your Collection of Mathematics Experiences will consist of a collection of the following assignments which demonstrate the important ideas you have learned from this course regarding the teaching and learning of elementary mathematics and to demonstrate your ability to translate those ideas into practice in the elementary classroom. The collection includes, **but is not limited to:** reading reflections, Mathematics Teaching Philosophy, Common Core “Advertisement,” Ten More, Basic Fact Assignment, Addition and Subtraction Invented Algorithms, Multiplication and Division Invented Algorithms, Multiplication Checkpoint, and Student Interview.

One Week Instructional Unit from an MPS-adopted Mathematics Program (20%)
**Due: April 30th**
The purpose of this assignment is to work as a collaborative instructional team to plan and implement a cohesive series of lessons in mathematics to a whole class of students that deepens and enriches students’ **conceptual** understanding of mathematics. The teaching portion of this project is **non-negotiable** (e.g. you must teach in order to receive credit for this project). **Ideally,** this instructional unit should be taught during the second full week in the field (week of April 15-18). If you are unable to teach your unit this week, you must contact me in a timely manner so alternate arrangements can be made.

Mid-Term Exam (10%)
**March 12th**
The mid-term exam will be allotted one hour and will be given at either the beginning or end of a class session on the date indicated in the course schedule. The remainder of the class period will be utilized for instruction.

Final Exam (15%) The final examination will be held on May 14th from 5:00-7:00 pm in Enderis 488. The final examination will be cumulative.

Exams (both mid-term and final) are given on the day scheduled, with no make-up exams allowed for unexcused absences. Arrangements for excused absences must be discussed with the instructor in advance of the exam. Both mid-term and final exams will include short answer prompts. The items will also include student work analysis, lesson and activity critiques, and analysis of assessment tasks. The examinations will ask you to apply what you have learned in class as well as demonstrate that you know and understand the subject matter, math tasks, and course readings (i.e., textbook, articles, and handout).
Guidelines for the Philosophy of the Teaching and Learning of Mathematics
First Draft Due: January 29th
Final Draft Due: May 7th

Be sure to save the first draft of your philosophy with my written comments and questions on it. This will be stapled to your final draft and turned in at the end of the semester.

Address the following questions in your first draft:
- What is mathematics?
- What does it mean to understand mathematics?
- What mathematical content might be important to teach in elementary school mathematics?
- In addition to mathematical content, what behaviors or dispositions might be important to develop in your learners in order for them to be successful at mathematics (regardless of ability or age)?
- What do you think will be effective teaching strategies for various learners?
- What might your role as a mathematics teacher encompass?
- Describe an environment that you think will promote the learning of mathematics.

Address the following question in your final draft:
- How have your ideas about teaching, and specifically the teaching of mathematics, changed or grown since the beginning of the course?
- Which of the eight standards for mathematical practice (CCSS) do you feel you’ve shown the most growth in this semester? Why? Give examples/elaborations to support your beliefs.
- Highlight a crucial learning experience (this semester) for you regarding the teaching and learning of mathematics. How did this experience affect your view of children as learners of mathematics and yourself as a teacher of mathematics?
- What are your goals for your students in learning mathematics?
- What is the role that you will play in the mathematics classroom?
## Tentative Course Schedule

<table>
<thead>
<tr>
<th>Dates</th>
<th>Topics</th>
<th>Readings Completed Prior to Class</th>
<th>Assignments Due</th>
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</thead>
</table>
| **Class Session #1**  
January 22 | • Introductions  
• Reflections on previous mathematics learning  
• Common Core State Standards for Mathematics (CCSSM)  
  - NCTM Principles and Standards  
• Counting and Cardinality (K.CC)  
• Course Syllabus | Van de Walle  
Chapter 1  
Shafto, E. (2011)  
Visions of My Younger Self  
Common Core State Standards for Mathematics (CCSSM pgs. 3-8)  
Course Syllabus | Bring a downloaded, printed copy of the Common Core State Standards for Mathematics from D2L. You only have to print off pages 1-38 and pgs. 85-90. It’s a good idea to keep this document in 3-ring binder. |
| **Class Session #2**  
January 29 | Knowing and Doing Mathematics  
  - The 1 ¾ ÷ ½ problem  
  - Constructivist Theory  
  - Conceptual vs. Procedural Knowledge  
  - Instrumental vs. Relational Understanding  
  - Modes of Representation  
Operations and Algebraic Thinking (K.OA, 1.OA)  
Early Number Relationships 1-10 | VdW Chapter 2, pp. 19-29  
VdW Chapter 8  
Clements: Subitizing What Is It? Why Teach It? (write reflection on this article) | Mathematics Teaching Philosophy – 1st draft  
Reading Reflection #1: Clements article |
| **Class Session #3**  
February 5 | Standards for Mathematical Practice  
Operations and Algebraic Thinking (1.OA, 2.OA): Addition & Subtraction  
(Development of Basic Facts for Addition & Subtraction)  
Discussion of Addition and Subtraction Invented Algorithm Assignment  
Discussion of “Student Basic Facts” Assignment | VdW Chapter 10, pp. 171-180 & pp. 186-189  
Kling, Fluency with Basic Facts, 2011 | Standards for Mathematical Practice “Advertisement” (cooperative assignment)  
Reading Reflection #2: Kling Article |
<table>
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</table>
| Class Session #4  February 12 First day of fieldwork | **Operations and Algebraic Thinking**  
- solving and representing problems with addition and subtraction, problem types  
- Equations/equality  
- children’s solution strategies  
  - direct modeling  
  - counting  
  - numerical reasoning  
**Discussion of Student Interview Assignment** | VdW Chapter 9 pp. 148-158  
Common Core State Standards pg. 88  
Mooney and Lubinski : Inside the Minds of Six Year Olds  
Hoosain and Chance: Problem-Solving Strategies of First Graders | 1. Solve the following addition and subtraction problems using **two** strategies other than the traditional algorithms. Then solve the problems using the traditional algorithm. **Explain and represent your thinking using symbols, words, and/or diagrams, as appropriate for each strategy.** Also, put your thoughts, attempts, and missteps all on paper.  
- 256 + 687  
- 48+25  
- 40-26  
- 436-289  
3. **Begin** conversing with your cooperating teachers about your Instructional Unit (i.e. What topic to teach, the degree of freedom you have in choosing how to teach, etc.). |
| Class Session #5  February 19 | **Number & Operations in Base Ten (Place Value)**  
- Understanding base ten  
  - Groupable and pregrouped models  
  - Base ten manipulatives  
  - Counting in base ten  
- model strategies for recording students’ mental math strategies (arrow language, empty number lines, equations, etc.)  
**Discussion of “Ten More” Assignment** | VdW Chapter 11 | Reading Reflection #3: You choose which article to reflect upon:  
Mooney & Lubinski  
OR  
Hoosain & Chance  
Student Basic Fact Assignment Due |
| February 26 | NO CLASS  
FIRST FULL WEEK IN THE FIELD  
Use this time in the field to conduct the “Ten More” and “Student Interview” assessments with a struggling student. The write-up for each assignment is due March 5. |
<table>
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</table>
| Class Session #6   | **Number and Operations in Base Ten: Addition & Subtraction Computation** *(2.NBT, 3.NBT, 4.NBT)*  
| March 5            | - Computational Fluency with Multi-digit numbers  
|                    | - Student Invented Algorithms: Addition & Subtraction                                                                                                                                             | VdW Chapter 12                                                                                      | Reading Reflection #4: Huinker, et. al. article                                                     |
|                    |                                                                                                                                                                                                       | D2L: Huinker, Freckmann, and Steinmeyer: Subtraction Strategies from Children's Thinking: Moving toward Fluency with Greater Numbers | Ten More Assignment Due                                                                           |
|                    |                                                                                                                                                                                                       | Student Interview Assignment Due                                                                   |-----------------------------------------------------------------------------------------------------|
| Class Session #7   | **- MID-TERM EXAM**                                                                                                                                                                                   | VdW Chapter 3                                                                                      |-----------------------------------------------------------------------------------------------------|
| March 12           | **- Planning for Instruction**  
|                    |   - The Turkey Problem  
|                    |   - 3-part lesson  
|                    |   - Lesson Plan Components & Format                                                                                                                                  | VdW Chapter 4                                                                                      |-----------------------------------------------------------------------------------------------------|
| March 17-24        | **SPRING BREAK**  
|                    |   **NO CLASS**  
|                    |   **ENJOY YOUR TIME OFF!!!**                                                                                                                                               |                                                                                                    |-----------------------------------------------------------------------------------------------------|
| Class Session #8   | **- Planning for Instruction (cont’d.)**  
| March 26           |   - The Turkey Problem  
|                    |   - 3-part lesson  
|                    |   - Lesson Plan Components & Format                                                                                                                                  | VdW Chapter 5                                                                                      | -                                                                                                   |
|                    |   **- Assessment**  
|                    |   - Formative vs. Summative Assessment  
|                    |   - Purposes of assessment  
<p>|                    |   - Analysis of student work samples and providing descriptive feedback                                                                                                           | VdW Chapter 6                                                                                      |-----------------------------------------------------------------------------------------------------|</p>
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<tr>
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| **Class Session #9**<br>April 2 | **Operations and Algebraic Thinking (3.OA): Multiplication**<br>- conceptual foundations for understanding multiplication<br>- Role of Modes of Representation in understanding multiplication concepts<br>- representing and solving problems<br>- development of multiplication fact strategies | VdW Chapter 9 pp. 158-168<br>VdW Chapter 10 pp. 181-183<br>Common Core State Standards, p. 89 | A word of advice, this assignment may take longer than it appears. Please allow yourself plenty of time to work through the problems. Solve the following multiplication and division problems using **two number-based** strategies other than the traditional algorithms. Then solve the problems using the traditional algorithm. **Explain and represent your thinking using symbols, words, and diagrams, as appropriate for each strategy.** Also, put your thoughts, attempts, and missteps all on paper.  
- 27 x 4  
- 128 x 38  
- 36 x 17  
- 159/13  
- 4670/48 |
<p>| <strong>MPS Spring Break</strong>&lt;br&gt;No fieldwork |                                                                                     |                                   |                                                                                                                  |
| <strong>Class Session #10</strong>&lt;br&gt;April 9 | <strong>Number and Base Ten (4.NBT, 5.NBT): Multiplication</strong>&lt;br&gt;- apply place value understanding to multi-digit whole number multiplication&lt;br&gt;- Student Invented Algorithms&lt;br&gt;- Discussion of Multiplication Checkpoint Assignment | VdW Chapter 13, pp. 236-242&lt;br&gt;Fuson, K. C. (2003).Toward Computational Fluency in Multidigit Multiplication and Division. | Reading Reflection #5: Fuson article |
| April 16         | <strong>NO CLASS</strong>&lt;br&gt;SECOND FULL WEEK IN THE FIELD&lt;br&gt;<strong>Ideally,</strong> this is the time when you and your partner should be teaching your four-day instructional unit. If you are unable to teach your unit this week, you must contact me in a timely manner so alternate arrangements can be made. Also, this week, find time to conduct the multiplication checkpoint assessment with a small group of students. This assignment is due April 30 or May 7. |                                   |                                                                                                                  |</p>
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<thead>
<tr>
<th>Date</th>
<th>Class Session #</th>
<th>Topic</th>
<th>VdW Chapter</th>
<th>Additional Information</th>
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<td>April 23</td>
<td>#11</td>
<td><strong>Number and Base Ten (4.NBT, 5.NBT): Division</strong></td>
<td>13, pp. 243-255</td>
<td>Student Invented Algorithms</td>
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<tr>
<td></td>
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<td>- representing and solving division problem types</td>
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<td>- apply place value understanding to multi-digit whole number division</td>
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<td>- Student Invented Algorithms</td>
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<tr>
<td>April 30</td>
<td>#12</td>
<td><strong>Geometry:</strong></td>
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<td>Instruction Units</td>
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<td>- Van Hiele Levels</td>
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<td>Multiplication Checkpoint—optional due date</td>
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<td>- Development of Geometric Thinking</td>
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<td>- 2-Dimensional Shapes: Definitions, Attributes, and Interrelations</td>
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<td>- 3-Dimensional shapes: Definitions, Properties, and Interrelations</td>
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<td>- Connecting 2-D and 3-D Shapes</td>
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<td>May 7</td>
<td>#13</td>
<td><strong>Fractions</strong></td>
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<td>Mathematics Teaching Philosophy – 2nd Draft</td>
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<td>- Course Wrap Up</td>
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<td>Multiplication Checkpoint – optional due date</td>
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<td>May 14</td>
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<td><strong>FINAL EXAM</strong></td>
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<td>Enderis 488</td>
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