In this course, you will explore the teaching of mathematics, investigating both what to teach and how to teach it. The purpose of this course is to begin inquiry into mathematics teaching and learning that will guide you in your first teaching experiences and give you tools that will enable you to continue to inquire and learn as part of your work as a teacher. Current national reforms in mathematics education (e.g., the *Principles and Standards for School Mathematics* [National Council of Teachers of Mathematics, 2000]; the *Common Core State Standards-Mathematics* [National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010]; and *Principles to Actions: Ensuring Mathematical Success for All*, [National Council of Teachers of Mathematics, 2014]) and mathematics education researchers recommend that middle school teachers think in new ways about the content of their instruction (what to teach) and pedagogy (how to teach). This course is intended to *launch* you as a learner and teacher of mathematics in ways that correlate with these reforms.

In this course, you will explore how students learn mathematics and what is meant by deep understanding of mathematics. You will learn how to teach mathematics so that learners see relationships and connections among mathematics topics and between mathematics and other subjects. You also will learn how to develop a learning environment that promotes learning mathematics with understanding. Specifically, you will:

- Understand the content, methods, and materials necessary to teach mathematics in the middle school.
- Learn about research on students’ mathematical thinking and reform principles about teaching and learning mathematics.
- Learn how to build a learning environment that supports the teaching and learning of mathematics.
- Learn how to assess students’ mathematical thinking and plan instruction based on that assessment.
- Learn to make instructional decisions about the use of curricular materials, such as textbooks, other print resources, manipulatives, and technology in the teaching of mathematics in the middle school.

**Course Materials**

- National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: Author. (*Note: A 120-day free access to this document is available at nctm.org*)
Course Requirements

Attendance, Participation, and Mathematical Disposition. Attendance is an important part of your grade. Your active participation in each class session is vital to your learning as well as the learning of other students in the class. I expect you to attend all class meetings prepared and to be engaged as an active, collaborative participant during each class session, whether whole-class discussion, collaborative-group activity, or individual reflection is involved. Preparation for class includes completion of assigned readings and tasks. If you are unable to attend a particular class session, let me know before class. You are responsible for contacting someone in the class to find out what transpired in your absence. Assignments are to be submitted on time even if you are absent. Assignments are due at the beginning of the class period. Late assignments are scored at a maximum of half credit. Make-up exams may be scheduled only in the event of documented illness or emergency. You are expected to adhere to the classroom and testing procedures set forth for this class.

Professional disposition is expected at all times. Learning mathematics extends beyond learning concepts, procedures, and their applications. It also includes developing a disposition toward mathematics and seeing mathematics as a powerful way for looking at situations. Your mathematical disposition will be assessed using the recommendations of Standard 10 in the Curriculum and Evaluation Standards (National Council of Teachers of Mathematics [NCTM], 1989, p. 233):

The assessment of students’ mathematical disposition should seek information about their—
- confidence in using mathematics to solve problems, to communicate ideas, and to reason;
- flexibility in exploring mathematical ideas and trying alternative methods in solving problems;
- willingness to persevere in mathematical tasks;
- interest, curiosity, and inventiveness in doing mathematics;
- inclination to monitor and reflect on their own thinking and performance;
- valuing the application of mathematics to situations arising in other disciplines and everyday experiences;
- appreciation of the role of mathematics in our culture and its value as a tool and as a language.

Professional Resources: Illuminations Assignment. You will select a lesson from this resource, write a report based on particular criteria, and prepare a five to seven minute presentation for sharing in small groups of teachers in this class. You will receive detailed information on this assignment in class.

Professional Collaboration: Interview of a Middle School Mathematics Teacher. You will interview a middle school mathematics teacher to gain insights into issues related to active teaching practice. You will receive detailed information on this assignment in class.

Professional Practice and Reflection: Questions for Student Interview and Report of Student Interview. You will first prepare to interview a middle school student to learn about the student’s reasoning in a particular topic based on a reading from the CD for Units 1 or 2. You will submit the typed questions for the interview to me for feedback before you interview the student. After receiving feedback (and making corrections based on the feedback), you will interview a middle school student. In a typed report you will describe the students’ understanding and suggest appropriate instruction based on this assessment. You will receive detailed information on this assignment in class.

Professional Collaboration, Practice, and Reflection: Mathematics Lesson Plan, Teaching, and Reflection on Teaching. Working in a group with one or two other class members, you will select a lesson on a mathematics topic of your choice from a given selection of resources. You will develop the lesson for middle school students and adapt it into a 30-minute lesson that you will teach to our class. Your lesson should conform to the spirit of the Principles and Standards for School Mathematics (NCTM, 2000); the Common Core State Standards-Mathematics (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010); and Principles to Actions: Ensuring Mathematical Success for All, (National Council of Teachers of Mathematics, 2014). This implies that the lesson should focus on development of conceptual knowledge, problem solving, and active student learning. You will prepare a detailed typed lesson plan, and you will reflect on and evaluate your teaching in a typed report. You will receive detailed information on this assignment in class.

Professional Collaboration, Practice, and Reflection: Reflective Writing. You will occasionally prepare short written assignments during or outside of class that are related to the assigned readings and class activities. These assignments are designed to encourage you to reflect on and extend your thinking about particular topics. Reflective writing assigned as part of a class session must be completed during class on the day given.
Professional Collaboration, Practice, and Reflection: Curriculum Evaluation Project. Working in a group with one or two other class members, you will compare a lesson from a traditional middle school mathematics textbook and a lesson from a standards-based curriculum. You will evaluate how the lessons align with the framework of the Common Core State Standards-Mathematics (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010). You will receive detailed information about the typed assignment in class.

Resource Portfolio of Class Assignments and Materials. You will keep a 3-ring binder that contains completed assignments, all course handouts, and materials distributed by other class members. You will bring this binder to class on the assigned date.

Exams. You will complete two exams during the semester as scheduled on the syllabus. You will have access to manipulative materials that are available in the Mathematics Education Lab during the exams.

Final Exam. The final exam will be comprehensive. You must take the final exam with your fellow classmates at the scheduled time, which is Tuesday, May 5, 2015 at 2:00 – 3:50 p.m. Location to be announced.

Evaluation
Your final grade will be determined as follows:

<table>
<thead>
<tr>
<th>Assignments and Tests</th>
<th>Percent of Total Grade</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance, participation, and mathematical disposition</td>
<td>10%</td>
<td>20</td>
</tr>
<tr>
<td>Illuminations assignment</td>
<td>4%</td>
<td>8</td>
</tr>
<tr>
<td>Interview of a middle school mathematics teacher</td>
<td>5%</td>
<td>10</td>
</tr>
<tr>
<td>Questions for student interview and report of interview</td>
<td>15%</td>
<td>30</td>
</tr>
<tr>
<td>Mathematics lesson plan, teaching, and reflection on</td>
<td>15%</td>
<td>30</td>
</tr>
<tr>
<td>teaching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reflective writing</td>
<td>5%</td>
<td>10</td>
</tr>
<tr>
<td>Curriculum evaluation project</td>
<td>10%</td>
<td>20</td>
</tr>
<tr>
<td>Resource portfolio of class assignments and materials</td>
<td>1%</td>
<td>2</td>
</tr>
<tr>
<td>Exams</td>
<td>15%</td>
<td>30</td>
</tr>
<tr>
<td>Final exam</td>
<td>20%</td>
<td>40</td>
</tr>
</tbody>
</table>

Grading Scale
A  90% - 100% of point total   B  80% - 89.9% of point total   C  70% - 79.9% of point total
D  60% - 69.9% of point total   F  Below 60%   ***Note: NIU has adopted + or – grading*** for A, B, C

Performance Standards for Student Work

Level Standard to be Achieved for Performance at Specified Level

A Fully achieves the purpose of assignments. Insightfully interprets assignments, extends beyond assignments, or raises thought provoking questions. Shows clear understanding of concepts. Communicates effectively.

B Substantially completes purposes of assignments. Displays clear understanding of concepts, even though some less important ideas may be missing. Communicates successfully.

C Purposes of assignments not fully achieved; elaboration needed. Displays understanding of major concepts, even though some less important ideas may be missing. Limits communication to some important ideas. Results may be incomplete or not clearly presented.

D Important purposes of assignments not achieved; work may need redirection. Assumptions about the purposes may be flawed. Gaps in conceptual understanding are evident. Approach to assignments may lead away from successful completion. Results may be incomplete. Communication attempted.

Semester Schedule (Note: TLMGM is an acronym for your textbook.)

Week 1: January 13, 15
Unit 1—Creating a Learning Community/Mathematics Strand Reasoning with Patterns and Algebra: Sections 1.1 and 1.2
Assignment for January 15: TLMGM pp. 17-18 #15, 16, 17 and p. 27, #19—Read the cited pieces from Principles & Standards (A Vision for School Mathematics, Standards for Grades 6–8, Problem Solving Standards, Reasoning and Proof Standards) and prepare for discussion that focuses on the questions posed in TLMGM.

Week 2: January 20, 22
Unit 1: Sections 1.3 and 1.4
Assignment for this week:
TLMGM p. 38 #14—Read the cited pieces from Principles & Standards (Algebra Standards) and prepare for discussion that focuses on the questions posed.
TLMGM p. 46 #8-11
Print, read, and be prepared to discuss M. C. Gilbert, “Applying the Equity Principle” (found on CD: Unit 1 Readings, 1.2 Gilbert) and TLMGM pp. 27-28 #21
Print, read, and be prepared to discuss R. N. Rubenstein, “Building Explicit and Recursive Forms of Patterns with the Function Game” (CD: Unit 1 Readings, 1.3 Rubenstein) and TLMGM p. 38 #13
Due January 22: Illuminations Assignment

Week 3: January 27, 29
Unit 1: Sections 1.5, 1.6, 1.7
Assignment for this week:
TLMGM p. 56 #19—Read the cited pieces from Principles & Standards (Communication Standard) and prepare for discussion that focuses on the questions posed.
Print, read, and be prepared to discuss M. F. Chappell and M. E. Strutchens, “Creating Connections: Promoting Algebraic Thinking with Concrete Models” (CD: Unit 1 Readings, 1.5 Chappel) and TLMGM pp. 55-56 #16-18
Print, read, and be prepared to discuss C. Greenes and C. Findel, “Developing Students’ Algebraic Reasoning Abilities” (CD: Unit 1 Readings, 1.6 Greenes) and TLMGM pp. 65-66 #14-17
Due January 29: Reflective Writing I

Week 4: February 3, 5
Unit 2—The Learning of Mathematics/Mathematics Strand Rational Numbers and Their Uses: Sections 2.1 and 2.2
Assignment for this week:
TLMGM p. 91 #25 and p. 103 #15—Read the cited pieces from Principles & Standards (Representation Standard and Connections Standards) and prepare for discussion that focuses on the questions posed.
Print, read, and be prepared to discuss S. J. Lamon “Presenting and Representing: From Fractions to Rational Numbers” (CD: Unit 2 Readings, 2.1 Lamon) and TLMGM p. 91 #23-24
Due February 5: Questions for Student Interview

Week 5: February 10, 12
Unit 2: Section 2.3
Assignment for this week:
Print, read, and be prepared to discuss B. J. Reys, “Promoting Number Sense in the Middle Grades” (CD: Unit 2 Readings, 2.3 Reys) and TLMGM p. 110 #10
Print, read, and be prepared to discuss M. F. Chappell and D. R. Thompson, “Modifying Our Questions to Assess Students’ Thinking” (CD: Unit 2 Readings, 2.3 Chappell) and TLMGM p. 110 #11
Due February 10: Prepared fraction circles (following directions given in class)
Due February 12: Report of the Interview of a Middle School Mathematics Teacher

Week 6: February 17, 19
Unit 2: Section 2.4
Assignment for this week:
TLMGM p. 120 #22—Read the cited pieces from Principles & Standards (Number and Operations Standards) and prepare for discussion that focuses on the questions posed.
Due February 19: Reflective Writing II
Week 7: February 24, 26
Unit 2: Sections 2.5, 2.6
Assignment for this week:
Print, read, and be prepared to discuss C. W. Langrall and J. Swafford, “Three Balloons for Two Dollars: Developing Proportional Reasoning” (CD: Unit 2 Readings, 2.5 Langrall) and TLMGM p. 127 #9
Print, read, and be prepared to discuss E. M. H. Billings, “Cocoa: Teaching Notes” (CD: Unit 2 Readings, 2.5 Billings) and TLMGM p. 127 #10
Print, read, and be prepared to discuss H. A. Khoury, “Exploring Proportional Reasoning: Mr. Tall/Mr. Short” (CD: Unit 2 Readings, 2.5 Khoury) and TLMGM p. 127 #11
February 26: Exam 1

Week 8: March 3, 5
Unit 3—Planning and Instruction/Mathematics Strand Geometry, Measurement, and Transformations: Section 3.1
Assignment for this week:
TLMGM p. 151 #16—Read the cited pieces from Principles & Standards (Measurement Standards) and prepare for discussion that focuses on the questions posed.
Print, read, and be prepared to discuss M. S. Smith and M. K. Stein, “Selecting and Creating Mathematical Tasks: From Research to Practice” (CD: Unit 3 Readings, 3.1 Smith) and TLMGM p. 151 #15
Due March 5: Report of Student Interview

Spring Break: Week of March 8

Week 9: Week of March 17, 19
Unit 3: Section 3.2
Assignment for this week:
TLMGM p. 162 #18—Read the cited pieces from Principles & Standards (Geometry Standards) and prepare for discussion that focuses on the questions posed.
Due March 19: Reflective Writing III

Week 10: March 24, 26
Unit 3: Section 3.3
Assignment for this week:
Print, read, and be prepared to discuss M. L. Crowley, “The van Hiele Model of the Development of Geometric Thought” (CD: Unit 3 Readings, 3.3 Crowley) and TLMGM p. 174 #19-21
Due March 26: Curriculum Evaluation Project

Week 11: March 31, April 2
Unit 3: Sections 3.4, 3.5 and 3.6
Assignment for this week:
TLMGM p. 199 #14—Read the cited pieces from Principles & Standards (Teaching Principle) and prepare for discussion that focuses on the questions posed.
Print, read, and be prepared to discuss M. K. Stein and M. S. Smith, “Mathematical Tasks as a Framework for Reflection: From Research to Practice” (CD: Unit 3 Readings, 3.6 Stein) and TLMGM p. 199 #13
Print, read, and be prepared to discuss M. F. Chappell and D. R. Thompson, “Perimeter or Area? Which Measure Is It?” (CD: Unit 3 Readings, 3.6 Chappell) and TLMGM p. 199 #15
April 2: Exam 2

Week 12: April 7, 9
Unit 4—Assessment/Mathematics Strand Data Analysis and Probability: Section 4.1
Assignment for this week:
TLMGM p. 215 #13—Read the cited pieces from Principles & Standards (Assessment Principle) and prepare for discussion that focuses on the questions posed.
Print, read, and be prepared to discuss T. Belcher, G. Davila Coates, J. Franco, and K. Mayfield-Ingham, “Assessment and Equity” (CD: Unit 4 Readings, 4.1 Belcher) and TLMGM p. 215 #12
Lesson Presentations
Week 13:  April 14, 16  
Unit 4: Section 4.2  
Assignment for this week:  
Print, read, and be prepared to discuss J. S. Zawojewski and J. M. Shaughnessy, “Mean and Median: Are They Really So Easy?” (CD: Unit 4 Readings, 4.2 Zawojewski) and TLMGM pp. 229–230 #22 and 23  
Print, read, and be prepared to discuss S. N. Friel and W. T. O’Connor, “Sticks to the Roof of Your Mouth” (CD: Unit 4 Readings, 4.2 Friel) and TLMGM p. 230 #24  

Lesson Presentations  
Week 14:  April 21, 23  
Unit 4: Section 4.3  
Assignment for this week:  
TLMGM p. 240 #11—Read the cited pieces from Principles & Standards (Data Analysis and Probability Standards) and prepare for discussion that focuses on the questions posed.  

Lesson Presentations  
Week 15:  April 28, 30  
Unit 4: Sections 4.4, 4.5, and 4.6  
Assignment for this week:  
Print, read, and be prepared to discuss R. J. Quinn, “Using Attribute Blocks to Develop a Conceptual Understanding of Probability” (CD: Unit 4 Readings, 4.5 Quinn) and TLMGM p. 254 #12  
Print, read, and be prepared to discuss W. S. Bush, M. Bennion, L. Dworkin, L. Romagnano, and C. Ronchinsky, “Does This Count for Our Grade?” (CD: Unit 4 Readings, 4.5 Bush) and TLMGM p. 255 #13  

Due: April 28: Reflection on Teaching  
Due April 28: Resource Portfolio  
Final Exam: Tuesday, May 5, 2015 at 2:00 – 3:50 p.m. Location to be announced.  

Note: Changes and adjustments may be made to this syllabus when judged appropriate by the instructor. Such changes, should they occur, will be announced in class.  

Academic Conduct:  
Academic honesty and mutual respect (student with student and instructor with student) are expected in this course. Academic misconduct, as defined by the Student Judicial Code, will not be tolerated.  

Qualified Students with Disabilities:  
Northern Illinois University abides by Section 504 of the Rehabilitation Act of 1973, which mandates reasonable accommodations be provided for qualified students with disabilities. If you have a disability and may require some type of instructional and/or exam accommodation, please contact your instructor early in the semester so that the instructor can provide or facilitate in providing accommodations you may need. If you have not already done so, you will need to register with the Disability Resource Center (DRC), the designated office on campus to provide service and administer exams with accommodations for students with disabilities. The DRC is located on the 4th floor of the NIU Health Services building (815-753-1303).  

General Classroom Etiquette:  
• Please set your cell phone to vibrate during class and only use your cell phone when it is a true emergency.  
• No phones, iPods, and other electronic devices can be used for any in-class work including quizzes, exams, and reflections.  
• Arrive on time, come prepared for class, stay to the end of class, and be in the classroom for the entire session, unless you have an emergency situation.  
• Only students who are registered for this course should attend class sessions.  
• Give your attention to the presenters during class, whoever they may be.  
• Professional disposition is expected at all times.  

Course Lab Fee: A lab fee charged for enrollment in this course is used to replace and update materials pertaining to instruction of the course and research on instruction of the course.  

MATH 410, Spring 2015, Dr. Mary Shafer  
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