

**MATH 402**  
**Fall 2009**

**METHODS OF INSTRUCTION IN THE MATHEMATICS**  
**CURRICULUM FOR GRADES K-6**

**INSTRUCTOR: Ellen Hines**

Office: Watson 358 Phone: (815) 753-6756 email: [hines@math.niu.edu](mailto:hines@math.niu.edu)  
Math 402 Webpage: <http://www.math.niu.edu/courses/402>

Office hours:

**TEXT AND MATERIALS:**

Van de Walle, J., Karp, K., & Bay-Williams, J. (2004). *Elementary and Middle School Mathematics: Teaching Developmentally* (7th ed.). Boston, MA: Allyn and Bacon/Longman, Inc.

Math 402 *Resource Packet* Available on the Math 402 website

Optional: *Math Manipulative Starter Kit*, ETA

**COURSE OBJECTIVES:**

The purpose of this course is for participants to undertake an investigation into the learning and teaching of mathematics at the elementary level. Your inquiry will support your initial mathematics teaching endeavors and enable you to continue learning as your teaching practice matures. You will investigate how children 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 within and between mathematics ideas. You also will learn how to encourage expectations for self-reliance in students and how to build a foundation of knowledge to support their more advanced study of mathematics. Specifically, you will

- Understand the content, methods, and materials necessary to teach elementary mathematics
- Understand different types and characteristics of knowledge and learning in mathematics
- Understand how to informally assess students' mathematical thinking and plan appropriate instruction
- Learn how to build an instructional environment that supports the teaching and learning of mathematics
- Learn how to make instructional decisions about the use of curricular materials, manipulative materials, technology, supplemental materials

**EVALUATION:**

Course grades will be determined according to point totals accumulated during the semester. A student must complete all assignments in order to receive a grade of "C" or higher for the course. Activities and point values are as follow:

Mathematical disposition/attendance/participation	10%	20 pts.
Reflective writing and other written assignments	10%	20 pts.
Professional Resource Report (journal, online, etc.)	10%	20 pts.
Interview/Assessment report	10%	20 pts.
Lesson plan and implementation report	10%	20 pts.
Curriculum Analysis	5%	10 pts.
Math Computation Quiz	0%	*
2 in-class course quizzes	20%	40 pts.
Final Exam	25%	50 pts.

**\* The Math computation quiz must be successfully completed with a score of 80% or more, in order to receive a grade of “C” or higher for the course.**

### **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 %	

### **ASSESSMENT STANDARDS**

<b>Level</b>	<b>Standard to be achieved for performance at a specified level</b>
A	Student fully achieves the goals and objectives of the assignment, has made accurate observations, drawn insightful conclusions and/or extensions, and shows clear understanding of concepts. Communicates effectively.
B	Student substantially achieves goals and objectives of the assignment, displays clear understanding of concepts, although some less important ideas may not be in place. Communicate successfully
C	Student addresses all aspects of assignment, but goals and objectives may not be fully met. Student displays understanding of concepts, although elaboration may be needed and some less important ideas may not be in place. Student gives limited communication of some important ideas. Results may be incomplete or not clearly presented
D	Important goals or objectives of the assignment are not met. Work may need redirection. Gaps in conceptual understanding are present. Student’s approach to assignment may lead away from assignment completion. Assumptions and/or conclusions are incomplete, or flawed. Attempts communication.
F	Goals and objectives of the assignment are not met. Shows little or not evidence of appropriate reasoning. Presents fragmented understanding of concepts. Presents erroneous or extraneous conclusions.

### **COURSE REQUIREMENTS**

**MATHEMATICAL DISPOSITION, ATTENDANCE, CLASS PARTICIPATION,– Your active participation in each class session is vital to your learning as well as to the learning of other students in the class. I expect you to attend all class meetings prepared for active, collaborative, participation during the session, whether it be whole group discussion, small group activity, or individual reflection.** Preparation for class involves completion of assigned readings and tasks. If you are unable to attend a particular class session, please let me know beforehand. You are responsible for contacting someone in the class to find out what transpired in your absence. **Late work will not be accepted.** Make-up quizzes or tests may be scheduled only in the event of documented illness or emergency.

**REFLECTIVE WRITING – You will prepare several short written assignments for class. Questions asked will be related to assigned readings and class activities and will be designed to encourage reflection and extension of thinking on the part of the student. Some reflective writing will be done in class. You must complete an in-class reflective writing assignment in class on the day it is given.**

PROFESSIONAL RESOURCE REPORT (paper journal or on-line resource) – Working with a partner, you will prepare an evaluative discussion of an approved article from a professional mathematics teaching resource. Give a 1-paragraph introduction of the article. Identify specific components of the mathematics content that are addressed in the article. Identify and discuss key points of the article related to learning and teaching the mathematics topic as discussed in the resource, including, but not limited to, difficulties students may have with the content and potential extensions of the instructional idea.

INTERVIEW/ASSESSMENT REPORT: Working individually, you will develop an informal assessment instrument and interview an elementary student about a specific mathematical topic. Based on the findings of the interview, describe the student's understandings, misconceptions, and suggest a lesson plan to address a single misconception or knowledge gap which you observed. Keep in mind that lesson planning is closely tied to your assessment and should be developed to be appropriate for observed student needs.

LESSON PLAN AND REFLECTION – Working with a partner, and through collaboration with your clinical classroom teacher, you will prepare and teach a problem-solving lesson presented to students at your clinical setting. Your goal is for the lesson to develop **concepts** from a topic of choice.

Following completion of teaching, you will individually complete a reflective writing assignment concerning the implementation of the lesson.

CURRICULUM ANALYSIS – You will examine and evaluate a mathematics lesson from an instructor approved source. Provide a copy of the lesson and write a 1-paragraph summary for the lesson. Then evaluate how the lesson fits into the framework of the *Principles and Standards* as described in NCTM *Curriculum Focal Points*.

MATH COMPUTATION QUIZ – Proficiency in the basic skills should be demonstrated during the semester. To demonstrate proficiency, you will be required to complete a test of basic skills covering fundamental topics in the following areas: whole number, integers, fractions, decimals, geometry, measurement, ratio, proportion, percent, probability and statistics.

COURSE QUIZZES – Quizzes will be completed during class time as scheduled in the syllabus. Students may have access to any manipulative materials available in the lab while they complete the quizzes.

FINAL EXAM – The final exam will be comprehensive. Part of the exam will be common to all Math 402 sections. Part will be for our class only. **You must take the final exam with your fellow classmates at the scheduled time.**

## SCHEDULE

### **Week 1:** Introduction and Course Overview

How children learn mathematics with understanding  
Conceptual and Procedural Knowledge  
NCTM Standards and Principles  
Using Technology to Support Learning

Read: Ch 1: Teaching Mathematics in the Era of the NCTM Standards  
Ch 2: Exploring What it Means to Know and Do Mathematics  
Ch 7: Using Technology to Teach School Mathematics

### **Week 2:** Problem Solving, Reasoning, Planning for instruction

Read: Ch 3: Teaching Through Problem Solving  
Ch 4: Planning in the Problem-Based Classroom  
Ch 6: Teaching Mathematics Equitably to All Children

**Math Computation Quiz (in class)**

### **Week 3:** Early number concepts, beginning whole number operations

Read: Ch 8: Developing Early Number Concepts and Number Sense  
Ch 9: Developing Meanings for the Operations  
Ch 10: Helping Children Master the Basic Facts

**Turn In: Professional Resource Report**

### **Week 4:** Place Value Concepts

Read: Ch 5: Building Assessment into Instruction  
Ch 11: Developing Whole-Number Place-Value Concepts

**Quiz 1 (in-class)**

### **Week 5:** Computational Algorithms: Building on Place value concepts, estimation, mental math, number sense

Read: Ch 12: Developing Strategies for Whole-Number Computation  
Ch 13: Using Computational Estimation with Whole Numbers

### **Week 6:** Fraction Concepts

Read Ch 15: Developing Fraction Concepts  
Ch 16: Developing Strategies for Fraction Computation

### **Week 7:** Fractions, Decimals and Percents

Read Ch 17: Developing Concepts of Decimals and Percents

**Turn in: Lesson Plan for Clinical Experience**

### **Week 8:** Measurement

Read Ch 19: Developing Measurement Concepts

**Quiz 2 (in-class)**

**Week 9: Algebra Concepts**

Read Ch 14 Algebraic Thinking: Generalizations, Patterns, and Functions  
Ch 18: Proportional Reasoning

Turn in: **Interview/Assessment Report**

**Week 10: Clinical Experience**

**Week 11: Clinical Experience**

**Week 12: Clinical Experience**

**Week 13: Geometric Thinking**

Read Ch 20: Geometric Thinking and Geometric Concepts  
**Turn in Lesson Plan Reflections**

**Week 14: Probability and Statistics**

Read: Ch 21: Developing Concepts of Data Analysis  
Ch 22: Exploring Concepts of probability  
**Presentations of Curriculum Analysis**

**Week 15:**

**Presentations of Curriculum Analysis**

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**FINAL EXAM: Wednesday, December 9, 2009, 8:00 PM, Location to be announced**

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**Note: 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.

**Note: Students with Disabilities:**

NIU 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 examination accommodation, please contact me early in the semester so that I can provide or facilitate in providing accommodation you may need. If you have not already done so, you will need to register with the Center for Access-Ability Resources (CAAR), the designated office on campus to provide services and administer exams with accommodations for students with disabilities. The CAAR office is located on the 4<sup>th</sup> floor of the University Health Services building (815-753-1303). I look forward to talking with you soon to learn how I may be helpful in enhancing your academic success in this course.

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