

Math 352

(Revised: 4/1/11)

Foundations of Teaching Mathematics: PreK-6

Advising:

This course is a required course for **Early Childhood, Elementary Education, and Liberal Studies** majors.

This is a mathematics methods course (formerly included as part of the interdisciplinary IDIS 360). To meet Massachusetts teacher licensure requirements, students are required to take Math 153, Math 250, and MATH 352. To have comprehensive coverage of the content strands in mathematics, students **must** take all of Math 153, Math 250, Math 251, and Math 252.

Math 250, Math 251, and Math 252 are the only mathematics courses that can be used to fulfill the “upper level” requirement for Early Childhood and Elementary Education majors.

Course description:

Designed to introduce the prospective early childhood, elementary, and special education school teacher to the teaching of mathematics. An activity-based format will be used to create a learning environment that fosters an exploration of the processes of mathematics. Emphasis will be placed on the role and use of manipulatives in a laboratory setting that encourages the development of fundamental concepts in mathematics. Topics may include: the inductive and deductive processes, measurement, graphing, cognitive development theory, the learning cycle, discussion of innovative projects, state and national frameworks, techniques for assessment, number and arithmetic operations, patterns, variables, modeling and geometry. Three contact hours per week, including substantial laboratory/activity time. Prerequisites: Math 150 and one of the Math 25x mathematics subject matter courses, or permission of instructor

Course Objectives:

The student will use course content and experiences to develop the following understandings and abilities:

- 1) An understanding of current trends in mathematics education policy and goals.
- 2) An understanding of constructivist learning theory and practices that promote mathematics literacy.
- 3) An awareness of the variety of curricular approaches available to elementary mathematics educators, including inquiry, discovery, and interdisciplinary curricula.
- 4) An ability to design mathematics lessons and units that are developmentally appropriate and sensitive to the needs, values, and interests of a diverse group of students.
- 5) An ability to construct assessment plans that are compatible with teaching goals and methods and that allow for multiple ways of representing knowledge.
- 6) An ability to use multimedia technologies to support meaningful learning.
- 7) An understanding of the role of reflection in professional development and lifelong learning.
- 8) An awareness of organizations and resources that serve the professional development of elementary mathematics teachers.

Standards of Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. The first of these are the NCTM process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are the strands of mathematical proficiency specified in the National Research Council’s report *Adding It Up*: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one’s own efficacy).

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Textbook:

Elementary and Middle School Mathematics—Teaching Developmentally, John A. Van De Walle, 7th edition, Pearson Allyn and Bacon.

Topics:

- ∞ Understand different learning styles.
- ∞ Comparing different teaching styles.
- ∞ Inquiry-based Learning in Mathematics.
- ∞ Planning in The Problem-Based Classroom. (Chapter 5)
- ∞ Building Assessment into Mathematics Instruction. (Chapter 6)
- ∞ Using Technology in Mathematics Instruction. (Chapter 8)
- ∞ Using Manipulatives in Mathematics Instruction.
- ∞ Memorizing versus Understanding, e.g. for the multiplication facts using memorization only versus understanding the use of the distributive property.
- ∞ Differentiated Instruction in the Mathematics Classroom.
- ∞ Teaching Mathematics in the Era of the NCTM Standards and the Massachusetts Curriculum Frameworks, e.g. Content Areas investigated by Grade Level and Teaching Methods. (Parts of Chapters 1, 9 - 23)
 - Number Sense (9-14)
 - Algebra and Fractions (15-18)
 - Geometry and Measurement (19-21)
 - Probability and Statistics (22, 23)