Administrative Unit: Education Department

Course Prefix and Number: EDUC 359

Course Title: Teaching Mathematics in the Middle School

Number of Credit Hours: 3 Lecture Hours: 3 Laboratory Hours: 

Catalog Description: A major goal of this course is to empower prospective middle school mathematics teachers to develop a sound mathematical program that is based on the needs and characteristics of the middle school student. To this end, the course will provide an integration of mathematics content and the middle school philosophy while examining the learning and teaching at this level. Includes observation/participation in appropriate school settings. Field experience is 15 hours. $20 lab fee. Offered odd Spring (1st eight weeks).

Prerequisite(s)/Corequisite(s): EDUC 101, EDUC 300; admission to the Teacher Certification Program and instructor’s permission (must be obtained at least one semester prior to taking this course).

DESE Quality Indicators
Targeted: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11.

Text(s): Most current editions of the following:


*Missouri Frameworks for Curriculum Development in Mathematics (K-12).*

*Missouri Grade Level Expectations for Mathematics (K-12).*

Released items from the MAP test.

Course Objectives:

• To increase confidence and ability as teachers of mathematics by developing a deeper understanding of the mathematics they will teach. MoSTEP QI: 1.2.1.1

• To study and explore a variety of teaching strategies and materials for developing mathematical thinking, including:
  • The role of mathematical tasks in learning concepts;
- The role and value of multiple representations (numerical, graphical, symbolic, and situational) to support the development of mathematical thinking;
- The role and value of appropriate tools (graphing calculators, spreadsheets, manipulatives, applets, the internet, etc.) for developing and connecting mathematical concepts;
- Curriculum materials for supporting learning (e.g. NSF-funded mathematics curriculum and other Standards-based Curriculum);
- Methods to provide learning opportunities for all students to learn mathematics, regardless of individual learning styles or cultural differences. MoSTEP QI: 1.2.1.2, 1.2.3.3., 1.2.3.4., 1.2.4.1., 1.2.5.1., 1.2.11.2., 1.2.11.3.
- To engage as learners, in mathematical tasks that require critical thinking skills. MoSTEP QI: 1.2.9.1
- To read and reflect on a number of well-known and recently published works in mathematics education in order to support an understanding of research-based knowledge regarding the learning and teaching of mathematics. MoSTEP QI: 1.2.1.3., 1.2.1.4., 1.2.2.3., 1.2.2.4., 1.2.3.1., 1.2.3.2., 1.2.23.4., 1.2.4.1., 1.2.4.2., 1.2.5.2., 1.2.6.2., 1.2.7.1., 1.2.7.3., 1.2.7.4., 1.2.9.3.
- To examine personal beliefs about the learning and teaching of mathematics. MoSTEP QI: 1.2.2.4., 1.2.6.1., 1.2.9.2.
- To examine issues of assessment pertaining to the understanding of mathematics concepts. MoSTEP QI: 1.2.8.1., 1.2.8.2., 1.2.8.3., 1.2.8.4., 1.2.11.4.
- To become aware of and participate in professional organizations for mathematics teachers. MoSTEP QI: 1.2.9.2.

Measurable Learning Outcomes:

- Describe the significant changes in mathematics that are occurring at both the state and national levels.
- Compare and contrast their own views about what it means to do mathematics to both the traditional and reform views.
- Explain the constructivist view of learning mathematics and demonstrate effective teaching models aligned with this view.
- Explain the difference between relational understanding and instrumental understanding and between conceptual and procedural knowledge.
- Describe the role of models (manipulatives, technology, etc.) in helping develop mathematical understanding and create lesson plans that use models to help children develop a deep understanding of mathematical concepts.
• Define problem-solving and recognize its importance in developing mathematical understanding by constructing lesson plans that reflect a problem-solving method of teaching.

• Define assessment, describe its purpose, and demonstrate both formal and informal methods to integrate ongoing assessment into instruction.

• Describe the teacher’s role and the students’ roles in the mathematics classroom with regard to diversity of the student population and the various individual learning styles.

• Identify, describe and implement strategies for teaching problem-solving, number sense, spatial sense and geometry, probability, statistics, operations, computations, measurement, and algebra.

Topical Outline (major areas of coverage):

• Teaching Mathematics: Foundations and Perspectives
  • Teaching Mathematics in the Context of the Reform Movement
  • Exploring What It Means to Do Mathematics
  • Developing Understanding in Mathematics
  • Teaching Through Problem Solving
  • Building Assessment into the Classroom
  • Planning in the Problem-Based Classroom
  • Teaching All Children Mathematics
  • Technology and School Mathematics

• Development of Mathematical Concepts and Procedures
  • Developing Fraction Concepts
  • Computation with Fractions
  • Decimal and Percent Concepts and Decimal Computation
  • Developing Concepts of Ratio and Proportion
  • Developing Measurement Concepts
  • Geometric Thinking and Geometric Concepts
  • Exploring Concepts of Data analysis and Probability
  • Algebraic Reasoning
  • Exploring Functions
  • Developing concepts of Exponents, Integers, and Real Numbers

Material from this course may be tested on the Major Field Test (MFT) administered during the Culminating Experience course for the degree.

Recommended maximum class size for this course: 20

Library Resources: Online databases are available at http://www.ccis.edu/offices/library/resources.asp. You may access them from off-campus using your eServices login and password when prompted.
NOTE: The intention of the master syllabus is to provide an outline of the contents of this course, as specified by the faculty of Columbia College, regardless of who teaches the course, when it is taught or where it is taught. Faculty members teaching this course for Columbia College are expected to facilitate learning pursuant to the course objectives and cover the subjects listed in the topical outline. However, instructors are also encouraged to cover additional topics of interest so long as those topics are relevant to the course’s subject. The master syllabus is, therefore, prescriptive in nature but also allows for a diversity of individual approaches to course material.

Office of Academic Affairs
12/04