**Catalog Description:** This course will examine both finite and infinite mathematical processes used when solving problems involving discrete or continuous data. The course connects experiences from the concepts of numbers, algebra, and data analysis. Credit only for The Missouri Cooperative Online Masters Degree in Teaching and Learning – Elementary Education.

**Course Description:** This course is designed to give students an opportunity to become familiar with content, instructional techniques and materials appropriate for teaching mathematics to elementary school students. Upon successful completion of this course, the student will have a deep understanding of the NCTM content standards. Data Analysis and Probability, Algebra, and Number and Operations.

**Rationale:** Teachers need a deep understanding of mathematical systems in order to develop appropriate lesson plans and to be able to make connections between number concepts and algebraic thinking.

**Credit Hours:** 3

**Prerequisites:** Successful completion of the program’s core courses and The Nature of Mathematical Thought.

**Conceptual Framework:**

**Course Objectives:** The student will:

A. gain knowledge of the development, use, and multiple representations of numbers and number systems.
B. develop an understanding of modeling the four basic operations in multiple contexts for development of algebraic reasoning/thinking.
C. use of a variety of mental computation and estimation techniques.
D. gain a conceptual understanding of probability as it relates to real world situations.
E. develop techniques for the collection, organization, representation, analysis, and interpretation of data through simulations.

**Course Content:** This course was developed in an outcomes-based format and was designed to conform to the 45 contact hour expectation common for three credit hour courses. The specific course content, outlined in the course objectives, will be delineated by the instructional design team and the instructor of record.

1) **Mathematical Systems**
   a) Continued Study of the properties of Real Numbers Through Student Generated Operations
   b) Properties of Subsets of Real Numbers
   c) Relationships of the Four Basic Operations
   d) Applying Properties of Real Numbers to Extend Mental Mathematics and Estimation

2) **Functions and Relations**
   a) Algebraic Reasoning
   b) Analyze Change in Various Contexts
   c) Multiple Representations
3) Data-Based Inferences and Probability
   a) Graphical Representations
   b) Line of Best Fit
   c) Normal Distribution
   d) Descriptive Statistics

4) Teaching as Reflective Practice
   a) Self-Reflection
   b) Reflection on Student Learning
   c) Reflection on Student Conjectures

Methods of Instruction: Discussion forums, e-mail, online exams and quizzes, focused discussion, reflection on web-based research on teaching.

Portfolio Requirement: Reflection paper on teaching that develops algebraic thinking, research paper using real world data, and an action research project related to children as mathematicians.

Research Component: A research project (including a paper) using real world data and an action research project related to children as mathematicians.

Grading Policy: Specifics to be determined by the instructional design team and the instructor of record
   - Reflection Papers 30%
   - Research Papers 50%
   - Participation in Online Discussion 10%
   - Quizzes and Other Assignments 10%

Course Schedule: To be determined by the instructional design team and the instructor of record.

Textbooks (Title, Author, ISBN): Selected by the instructional design team and the instructor of record. Suggested texts:

Teppo, A. 1999. Reflecting on Practice in Elementary School Mathematics: Reading from NCTM’s School-Based Journals and Other Publications. Reston, VA. NCTM. 0-87353-477-8


Library Review: A review of literature will be required to support the action research project. Issues of Teaching Children Mathematics, Mathematics Teaching in the Middle School, Arithmetic Teacher (back issues), Mathematics Teacher, Journal for Research in Mathematics Education, School Science and Mathematics


Other Required Software, Materials and Equipment: Students are required to use a graphing calculator, spreadsheets, and/or web-based technology to analyze data.
**Statement of Non-Discrimination:** Missouri’s public universities are equal-opportunity educational institutions and do not discriminate on the basis of race, color, national or ethnic origin, religion, sex, or sexual orientation for programs, activities, or employment, in accordance with the Civil Rights Act of 1964 and Title IX of the Educational Amendments.

**Statement on Academic Honesty:** Missouri’s public universities are committed to intellectual integrity in their academic pursuits. Academic dishonesty constitutes unacceptable behavior and includes unauthorized assistance in completing required course assignments or testing. Unauthorized assistance includes electronic transfer. Plagiarism, that is, submitting someone else’s work or part there of, as your own, is considered to be cheating.

Breaches if intellectual integrity will result in disciplinary measures, based on the policies and procedures of the student’s home instruction. These may include:

1) a failing grade for a particular assignment;
2) a failing grade for the course;
3) suspension for various lengths of time from the university; and/or
4) permanent expulsion from the university.

**Statement on Student Disabilities:** Reasonable accommodations will be provided upon request for persons with disabilities in accordance with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act of 1990. If you are a person with a disability, either learning related or physical, who requires an accommodation to participate in university programs, services, or activities, please contact the disability services staff at your university of record.

**Expected Enrollment:** 20-25

**Special Fees:** None

**Bibliography:**


