MA636 The Nature of Mathematical Thought

Catalog Description: This course will examine the nature of mathematics along with its historical, social and cultural aspects. Students will become familiar with the national as well as state principles and standards for teaching and learning mathematics. Students will explore current issues and trends in mathematics education. 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 to teaching mathematics to elementary school students. Upon successful completion of this course, the student will have a measurably significant understanding of national and state standards for mathematics and mathematics education and the historical development of mathematics in the dominant culture as well as among underrepresented cultures. Students will explore relevant classroom practice issues through writing reflections, experimenting with action research strategies and sharing of their work in a collaborative online environment.

Rationale: Investigating the history of mathematical thought will give teachers a perspective on the progress of the development of mathematics in the world. This will help teachers develop an appreciation for the vision of mathematics education outlined in the principles and standards for mathematics teaching and learning. Teachers will come to realize the value of action research as a way to make informed decisions about their teaching practices.

Credit Hours: 3

Prerequisites: Successful completion of the program’s core courses.

Conceptual Framework:

Course Objectives: The student will:
A. gain knowledge of historical development in mathematics that includes the contributions of underrepresented groups and diverse cultures.
B. model and explain a variety of alternative computational algorithms.
C. describe and represent mathematical relationships.
D. explore relevant classroom practice issues through writing reflections, experimenting with action research strategies and sharing of their work in a collaborative online environment, developing logical conjectures and conclusions.
E. investigate the implications of current research as well as national, state and local standards on instructional strategies and classroom practices.
F. be introduced to the professional community of mathematics education through research/investigation of current issues and trends.
G. use a variety of print and electronic resources.

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) Principles and Standards for Teaching and Learning of Mathematics
   a) NCTM’s Principles and Standards for School Mathematics  
   b) NCTM’s Assessment Standards for School Mathematics  
   c) NCTM’s Professional Standards for Teaching Mathematics  
   d) Missouri Show-Me Standards
2) Survey of the History of Mathematics
   a) Greek Mathematics
   b) Babylonian Mathematics
   c) Roman Mathematics
   d) Mayan Mathematics
   e) Modern Mathematics

3) Current Issues and Trends in Mathematics Education
   a) Mathematics Wars
   b) Integrating Technology in the Classroom
   c) High Stakes Testing
   d) International Studies
   e) Cultural Diversity and Gender Issues
   f) Mathematical Anxieties

4) Alternative Computational Algorithms

5) Problem Solving for Mathematical Understanding

6) Developing mathematical demonstrations for use in the classroom

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

**Portfolio Requirements:** Unit containing national and state standards that demonstrates the historical and social aspects of mathematics at the appropriate grade level for each student.

**Research Component:** Identify, research, and write paper(s) based on current issues and/or trends in mathematics education that is evident in the student’s classroom.

**Grade Policy:** Specifics to be determined by the instructional design team and the instructor of record
   - Instructional Unit 40%
   - Research Papers 40%
   - 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:


**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:** Additional materials may be selected by the instructional design team and the instructor of record.
Statement on 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:


Eves, H. *An Introduction to the History of Mathematics*.

Kagan, S. *Cooperative Learning*.


