

MATH 424 Organizing and Teaching Mathematics

1. Catalog Description

MATH 424 Organizing and Teaching Mathematics
CR/NC

4 units

Prerequisite: Acceptance into the Mathematics Single Subject Credential Program.

Organization, selection, presentation, application and interpretation of subject matter in mathematics. Introduction to current issues in mathematics education. For students who will be teaching in secondary schools. Credit/No Credit grading only. 4 lectures.

2. Required Background or Experience

Proficiency in the skills required for secondary school mathematics courses and an understanding of the basic concepts used and taught in secondary school mathematics.

3. Learning Objectives

The student should:

- a. Analyze his or her own beliefs about the nature of mathematics, what it means to do mathematics, to understand mathematics, and to teach mathematics; then compare these with historical perspectives.
- b. Begin to learn about students' understandings, beliefs, and misconceptions of middle and high school mathematics. Learn that this knowledge comes from listening to students and reading research in mathematics education.
- c. Understand the importance of developing instruction and assessment based upon students' understandings, beliefs and misconceptions about mathematics.
- d. Articulate the strengths and weaknesses of a wide variety of instructional strategies, including active learning and direct instruction strategies, that promote teaching students to work with multiple representations of significant mathematical concepts, such as function.
- e. Plan for effective teaching (i.e., student learning) of multiple representations in the fields of algebra, geometry, advanced high school mathematics and general mathematics.
- f. Make effective lesson plans and unit plans that incorporate a range of effective strategies to teach all students, including English language learners.
- g. Be able to use Eight Standards for Mathematical Practice and instructional materials that promote educational equity among diverse learners and support the learning of mathematics by English language learners. These include both active learning and direct instruction models that address multiple representations of mathematical concepts.
- h. Be familiar with mathematics texts currently used in the secondary school.
- i. Be familiar with the professional literature pertaining to secondary school mathematics.
- j. Be aware of the nature and function of professional organizations for mathematics educators.

4. Text and References

- Boaler, J. Mathematical Mindsets, Jossey-Bess, SF, CA
- Brahier, D. J. Teaching Secondary and Middle School Mathematics
- Cooney, Thomas J., et al, Mathematics, Pedagogy, and Secondary Teacher Education, Heinemann, New Hampshire.
- California Common Core State Standards – Mathematics Retrieve from <http://www.cde.ca.gov/ci/cc/>
- Standards for Mathematical Practice Retrieve from <http://www.corestandards.org/the-standards/mathematics/introduction/standards-for-mathematical-practice/>
- Smith, Margaret Schwan, et al, Implementing Standards-Based Mathematics Instruction: A Casebook for Professional Development
- Smith, M. and Stein, M. (2011). 5 Practices for Orchestrating Productive Mathematical Discussions

5. Minimum Student Materials

None

6. Minimum University Facilities

Smart classroom with adequate blackboard, overhead projector, Elmo Document Camera, and computers for both demonstration and for class use.

7. Content and Method

<u>Topic</u>	<u>Lectures</u>
a. Beliefs about mathematics, understanding mathematics, and teaching for understanding.	4
b. Backwards unit design: Method and planning to achieve effective instruction.	2
c. Definitions in textbooks: Functions and variables.	2
d. Teaching multiple representations of mathematical concepts.	8
e. Culture, diversity, equity and English language learners.	6
f. Specially Designed Academic Instruction in English strategies for mathematics.	2
g. Evaluation of instruction and designing assessment rubrics.	4
h. Student presentations.	9
Total	37

Method

Lectures, class time activities, activity analyses, oral reports, discussion, professional readings.

8. Methods of Assessment

Oral and written reports, quality and quantity of discussion, tests.