

MATH 300 Technology in Mathematics Education

1. Catalog Description

MATH 300 Technology in Mathematics Education

4 units

Prerequisite: MATH 248.

Examination of existing hardware and software designed for educational uses. Discussion of mathematical topics appropriate for computer enhancement. Special methods and techniques for educational uses of computers. Emphasis on activity learning and applications. Computer as a classroom management device. 4 lectures.

2. Required Background or Experience

Math 248.

3. Learning Objectives

The student should:

- a. Learn effective uses of current and emerging technology for the teaching and learning of mathematics.
- b. Use appropriate technology to conduct investigations, as a tool for problem solving and to enhance their mathematical understanding.
- c. Consider technology as a tool for gathering, managing, analyzing, processing, and presenting information.
- d. Consider the legal, ethical, and social issues involved with incorporating technology in mathematics education.
- e. Be able to communicate mathematics using appropriate technology.
- f. Develop skills in evaluating the educational potential of software and technology, and choose appropriate technology for a given problem.

4. Text and References

- Instructor handouts.
- Readings in appropriate journals.
- Downloaded technology such as Geogebra + Microsoft Excel.

5. Minimum Student Materials

Paper, pencils, and notebook.

6. Minimum University Facilities

Classroom with ample chalkboard space for class use, overhead projector, and computer laboratory.

7. Content and Method

Class will use appropriate technologies to cover some collection of the following topics:

a. **Multiple Representations of Functions**

Students investigate the graphical, numerical, and algebraic representations of functions, solve equations graphically, investigate sequences and series, and explore interactive algebra modules via web-based program such as Desmos.

b. **Data Analysis**

Students organize, display, and analyze data with the use of *Microsoft Excel* and *Fathom*. Students investigate recursive functions and write a program to compute and assign grades.

c. **Euclidean Geometry**

Students use the program *Geometer's Sketchpad* and/or Geogebra to construct geometric figures and explore their properties in order to formulate and explore theorems.

d. **Statistical Analysis**

Students investigate how the method of least squares minimizes area. Students investigate data transformations, modeling, residual plots and polynomial functions with the use of Desmos and/or Excel.

e. **Linear and Quadratic Functions, Conic Sections**

Students investigate the graphical representation of equations of lines, parabolas, hyperbolas, circles, and ellipses with the use of the program *Geometer's Sketchpad* and/or Geogebra.

f. **Tessellations**

Students explore rigid transformations, symmetry, and patterns to create tessellations with the use of the software *Geometer's Sketchpad* and/or Geogebra.

g. **Introduction to Set Theory**

Students explore ways of teaching fundamental principles of set theory, logic, and data analysis in grades K-8 with the use of web-based interactive modules via Desmos.

h. **Teaching Resources**

Students become familiar with teacher/student resources available on the World Wide Web and in journals.

i. **Mathematics Presentation**

Students complete a presentation that makes use of appropriate technology.

Method

Lectures, demonstrations, lab-based activity, student presentations.

8. Methods of Assessment

Evaluation of communication of mathematics investigations, written assignments, presentations, and portfolios.