

**SOUTHERN CONNECTICUT STATE UNIVERSITY
SCHOOL OF ARTS & SCIENCES
DEPARTMENT OF MATHEMATICS**

MAT 408: TECHNOLOGY FOR TEACHING SECONDARY SCHOOL MATHEMATICS

COURSE INFORMATION

- **Department:** Mathematics
- **Course Code and Number:** MAT 408
- **Number of Credits:** 3 credits
- **Catalog Description:** Mathematics-specific technology tools for the secondary mathematics teacher for lesson preparation and presentations. Techniques for integrating dynamic computer software, the graphing calculator and its applications in teaching. Designing technology-based activities for mathematics instruction. Field work component. Graphing calculator is required.
- **Purpose:** The focus of the course will be on the use of mathematics-specific technology to develop educational material that can be incorporated in the middle and high school mathematics classroom. Candidates will learn how to use graphing calculators and some of their applications, as well as GeoGebra, a dynamic software for Algebra, Geometry and Statistics, to engage students in the learning of mathematics and to create inquiry-based activities. The course has an embedded field work component divided between middle school and high school in different school settings.
- **Prerequisite:** Admission to the Math Certification Program or Departmental permission.
- **Mode of instruction:** Students will be active participants in the learning process by working with the different forms of technology through in-class activities. Interactive lectures will be used as well. Students are expected to participate in class activities and discussions, to complete all assignments, and to present projects in class using presentation software.
- **Technology.**
 - Graphing calculator approved by the instructor
 - Laptop or tablet is recommended
- **Date course to be first offered:** Spring 2016
- **Required Textbook:** No textbook required

RATIONALE

Selecting and using technology adequately in the teaching of Mathematics is an important competency that all pre-service teachers need to acquire and is one of the NCTM/CAEP standards. While technology is often integrated in other courses to assist in learning, candidates do not get the in-depth knowledge needed to teach with it. This course will focus on the use of technology to create motivating activities for middle school and high school students, Candidates will also learn to create inquiry-based activities leading to conjectures and conceptual understanding.

This course has a field work component: candidates will be placed in a middle school and in a high school in two different school settings. Candidates will get the chance to observe the use of technology in the teaching of mathematics and then will present some of the activities with middle and high school students. This field work experience will help us meet a required standard of the NCTM/CAEP standards for initial certification candidates to ensure their exposure to different school settings and different age groups.

COURSE OBJECTIVES

- Use knowledge of mathematics to select and use appropriate instructional technologies (graphing tools, interactive geometry software, computer algebra systems, and statistical packages) (NCTM/CAEP 4e)
- Plan inquiry-based activities using technology (calculator or dynamic software) to help students develop and test conjectures and generalizations (NCTM/CAEP 2b, 3c)
- Plan activities that engage students in developmentally appropriate mathematical activities and investigations that require active engagement and include mathematics-specific technology in building new knowledge (NCTM/CAEP 5b)
- Observe and participate in both middle and high school mathematics classrooms and work with a diverse range of students (NCTM/CAEP 7a)
- Develop knowledge, skills, and professional behaviors across both middle and high school settings (NCTM/CAEP 7c)
- Utilize resources from professional mathematics education organizations such as print, digital, and virtual resources/collections to select and plan activities using technology (NCTM/CAEP 6c)

OUTLINE

A. Calculator usage in the classroom: (30%)

1. Learning the basic features of the graphing calculator: Arithmetic operations, graphing of functions (inequalities, piecewise functions, etc.), tables, lists, statistics
2. Creating inquiry-based activities using graphing calculator.
3. Creating/selecting and using activities for middle or high school mathematics students using calculator Apps.

B. Dynamic Software (60%)

1. Creating worksheets and activities for students' explorations in Algebra and Geometry
2. Creating and selecting worksheets and activities with spreadsheets for inquiry-based activities in Algebra and Geometry
3. Creating worksheets and activities for students' exploration of Statistics
4. Selecting and using interactive worksheets for middle or high school mathematics students

C. Presentation tools (10 %)

1. Creating presentations and documents with embedded equations
2. Creating interactive worksheets using dynamic software for teacher presentation (using playback of construction)
3. Exporting constructions or worksheets to other formats

ASSESSMENT

The basic assessments of the course will include:

- Field work observations (journals)
- Field work activities: candidates are expected to plan and use technology-based activities in each of the school settings (one activity using a graphing calculator and one activity using dynamic software – one of the activity will take place with Middle school students and the other one with High School students)
- Creating inquiry based and/or exploration activities (handouts and worksheets for students):
 - 3 dynamic worksheets with: Algebra, Geometry, and Statistics
 - 2 activities using graphing calculators: one of them must be based on using an APP.

Individual instructors may add some other assessments to the list. A sample of grade distribution is presented below:

▪ Class activities or presentations	15%
▪ Journal entries (observation reports - reflection)	15%
▪ Field Work Activities (2)	20%
▪ Activities with Calculators (2)	20%
▪ Activities with GeoGebra (3)	30%

BIBLIOGRAPHY

- Research on Technology and the Teaching and Learning of Mathematics (2008) - Mary Kathleen Heid, Glendon W. Blume
- Teaching Secondary Mathematics with ICT (2005) - Sue Johnston-Wilder, David Pimm
- Designing Dynamic and Interactive Applications Using GeoGebra Software in the 6-12 Mathematics Curriculum (2009) - Luis F. Rincon- Kean University
- Using Technology for Problem Solving in Middle and High School Mathematics (2007) - Kenneth Goldberg
- Excel for the Math classroom (2007) – Hazlett and Jelen –Holy Macro Books
- <http://www.education.ti.com>
- <http://GeoGebratube.org>

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