College of Education Undergraduate Course Change Proposal
Signature Page

Course Title: Technology for Teaching Secondary Mathematics II
Course Prefix and Number: MAE 4653 Type of Change: SUBSTANTIVE
Name of Faculty Sponsor: Rick Austin Telephone:
Email: austin@usf.edu

APPROVALS
List appropriate Department Chair, Committee Chair, Faculty Council Chair and Associate Dean

Approving:
Dr. Stephen Thornton
Department Chair

SIGNATURE DATE

Patty McHatton
Name of UPC Chair

SIGNATURE DATE

Erwin Johanningmeier
College Council Chair

SIGNATURE DATE

Michael Stewart, Ph.D.
Name of Associate Dean

SIGNATURE DATE

CONCURRENCE
List other units and department of the University that have been consulted, comments and supporting remarks:

UNIT

CHOOSE ONE: CONCURRENCE, NON-CONCURRENCE or DEFER RECOMMENDATION

Name/Title
Signature
Date

UNIT

CHOOSE ONE: CONCURRENCE, NON-CONCURRENCE or DEFER RECOMMENDATION

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Name/Title
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Date

COUNCIL/DEAN APPROVALS
Recommendation of Undergraduate Council: Approved: _____ Disapproved: _____
Signature of Undergraduate Council Chair: ______________________ Date _______
Action by the Undergraduate School Dean: Approved: _____ Disapproved: _____
Signature of Undergraduate Dean: ______________________ Date _______
Effective Date (Term): ______________________
College of Education
UNDERGRADUATE COURSE CHANGE PROPOSAL

PLEASE INDICATE THE TYPE OF CHANGE YOU ARE REQUESTING TO MAKE:

SUBSTANTIVE  Change in course syllabus
NON-SUBSTANTIVE

1. DEPARTMENT AND CONTACT INFORMATION

Department  Secondary Education  College: Education
Budget account number:  172400  Secondary Education
Faculty Contact Name  Rick Austin  Phone:
E-mail:  austin@usf.edu

2. CURRENT COURSE INFORMATION

Prefix:  MAE  Number:  4653

Full Course Title:
Technology for Teaching Secondary School Mathematics II

Abbreviated Course Title: (not to exceed 30 characters)
Tech Teach Math II

The course title is variable?  ○ Yes  ○ No
Is a permit required for registration?  ○ Yes  ○ No
Are the credit hours variable?  ○ Yes  ○ No

Credit hours (list max if variable):  3  Total Clock Hours:  45
Section Type:  Class Lecture (Primarily)  Grading option:  Regular

Prerequisites
Admission to the Mathematics Education Program

Corequisites

Co-Prerequisites
Course Description (not to exceed 255 characters including spaces)

This course is required in the undergraduate program in Mathematics Education. The program provides prospective secondary mathematics teachers with the opportunity to develop concepts, skills and instructional procedures for effectively integrating tec

Please indicate in the description if the course:
* is restricted to majors or non-majors
* is repeatable for credit and, if so, for how many total credits

3. New Course Information (leave unchanged fields blank):

   New Prefix:       New Number:       

   New Full Course Title:  

   New Abbreviated Course Title: (not to exceed 30 characters)

   The course title is variable?    ○Yes    ○No
   Is a permit required for registration?    ○Yes    ○No
   Are the credit hours variable?    ○Yes    ○No

   New Credit hours (list max if variable):       New Total Clock Hours:       

   New Section Type:      New Grading option:       

   New Prerequisites

   MAE 4652 or CI

   New Corequisites

   New Co-Prerequisites
New Course Description (not to exceed 255 characters including spaces)

This course provides prospective mathematics teachers with an opportunity to develop concepts, skills and instructional procedures for effectively integrating technology into teaching algebra and data analysis into the secondary mathematics curriculum.

Please indicate in the description if the course:
* is restricted to majors or nonmajors
* is repeatable for credit and, if so, for how many total credits

4. JUSTIFICATION:
   a. Nature of change(s): Be specific. (Indicate the nature of all changes, i.e., change of objectives, course level, etc. State the reasons why the change is necessary and how it will improve the course or program.) A structural analysis of the course should be included. Indicate where this course is in relation to other courses in the program. How will the change impact the enrollment of the course? Does this change affect accreditation or certification?

This course began as a teaching with hand held technologies - essentially graphing calculators and their applications in mathematics classrooms. This change will shift a little bit in that the curricular focus will be limited to algebra, statistics and data analysis. There will still be a major focus on hand held technologies. The other major change is that MAE 4562 has become a prerequisite. Thus some initial computer applications can be used without going through all of the beginning instruction that will have been accomplished in the first technology class.

There should be no change in enrollment, just in the sequence of when the class is taken in the program of study for mathematics education majors.

The changes should have no effect on either accreditation or certification.

(Items "4.b." – "4.f." are ONLY for Substantive Course Changes)
   b. Indicate how this course will strengthen the Undergraduate Program.

The course change will help to make the sequence of courses for mathematics education majors clear and help to avoid repetition of topics needlessly. The new emphasis will actually make the course much more applicable to new mathematics teachers.

The program was strong before and this should not change that at all.
c. What specific area of knowledge is covered by this change that is not covered by courses currently listed?

The technology focus is shared across two classes. What is different is the focus in this course is on teaching topics from algebra, statistics and data analysis with technology. In general, the other main focus is on hand held (graphing calculator) technologies for classroom teaching.

d. What is the need or demand for this course? (Here you must indicate if this course is part of a required sequence in the major.) What other programs would use this course?

This course is required in the middle of the program of study for mathematics education majors. There are not likely to be other programs that would use this course.

e. What qualifications and/or experience are necessary to teach this course?

At least a masters degree and 18 graduate hours in mathematics education. Teaching experience, and graphing calculator experiences as well as a PhD would all be recommended qualifications.

f. What will be the effect of this change on the program and on the students? Do you plan to drop a course of this change is made?

No course will be dropped. The main change is that MAE 4652 will become a prerequisite for this course, thus the students will have to have a more structured sequence of classes than was previously required.
5. OTHER COURSE INFORMATION – Required for submission to the Statewide Course Numbering System (You must complete this section with the requested items. “n/a” or “unchanged,” etc. is not acceptable) If this section is not filled out, the course change will NOT be made!

a. Course Objectives/Student Learning Outcomes

Technology Standards Issues:

1. Knowledge of current research related to the use of particular technology (graphing calculators, symbolic manipulators, calculator based labs (CBL), data analysis and statistics exploration software) for instruction in the mathematics classrooms.

2. Knowledge of issues related to technology use for mathematics learning and teaching when technology is used as an integral part of instruction (e.g. Advantages / disadvantages, affordances / hindrances of using particular technology tools.

Technology to Support Communicating about Mathematics Effectively

3. Use of technology “in the cloud” to collaborate with others on the teaching and learning of mathematics.

4. Use of Power Point (or other presentation tools) to support the presentation of mathematics.

b. Major Course Topics

Historical overview of technology use in the mathematics classroom
Overview of current recommendations in the field related to the use of technology
Basic home screen and graphing features of a graphing calculator
Advanced graphing features (parametric equations, polar equations)
Characteristics of good lessons and strategies when using technology
Statistical regression features of graphing calculators
Calculator-based labs
Science connections

c. Course Textbooks

There is no text – Students will be required to complete readings and lab exercises posted on the Blackboard system or from a course readings booklet/packet. Extensive use will be made of web based tutorials and application information

6. Gordon Rule/General Education

This course is certified for:

This course is neither a Gordon Rule course nor a General Education course

7. Syllabus – If this is a substantive course change you MUST attach a copy of the syllabus.
The College of Education CARES

The College of Education is dedicated to the ideals of Collaboration, Academic Excellence, Research, and Ethics/Diversity. These are key tenets in the Conceptual Framework of the College of Education. Competence in these ideals will provide candidates in educator preparation programs with skills, knowledge, and dispositions to be successful in the schools of today and tomorrow. For more information on the Conceptual Framework, visit: www.coedu.usf.edu/main/qualityassurance/ncate_visit_info_materials.html

1. **Course Prefix and Number:** MAE 4653

2. **Course Title:** Technology for Teaching Secondary School Mathematics II

3. **Regular Instructor(s):**
   - Dr. Gladis Kersaint
   - Dr. Denisse Thompson
   - Dr. Helen Gerretson
   - Dr. Rick Austin
   - Dr. Eugenia Vomvoridi-Ivanovic

4. **Course Prerequisites (if any):** MAE 4652 or CI

5. **Course Description:**

   This course provides prospective mathematics teachers with an opportunity to develop concepts, skills and instructional procedures for effectively integrating technology into teaching algebra and data analysis into the secondary mathematics curriculum.

6. **Course Goals and Objectives:**

   Upon completion of this course, the student will have demonstrated:

   **Technology Standards Issues:**

   1. Knowledge of current research related to the use of particular technology (graphing calculators, symbolic manipulators, calculator based labs (CBL), data analysis and statistics exploration software) for instruction in the mathematics classrooms.

   2. Knowledge of issues related to technology use for mathematics learning and teaching when technology is used as an integral part of instruction (e.g. Advantages / disadvantages, affordances / hindrances of using particular technology tools).

   **Technology to Support Communicating about Mathematics Effectively**

   3. Use of technology “in the cloud” to collaborate with others on the teaching and learning of mathematics.

   4. Use of Power Point (or other presentation tools) to support the presentation of mathematics.

   **Competence with Specific Mathematics Technology**

   5. Competence on at least one model of graphing calculator.

January 2010
6. Competence with technology tools for teaching Number Concepts (e.g. Web-based manipulatives, web-based applets)

7. Competence with technology tools for teaching algebra concepts (e.g. Graphing calculator, spreadsheets, computer algebra systems (CAS) web-based applets)

8. Competence with technology tools for teaching data analysis and statistics (e.g. Dynamic data analysis software, web-based applets,)

Technology to support teaching and learning particular mathematics concepts

9. The ability to modify and develop lessons that use technology tools for teaching Number Concepts (e.g. Web-based manipulatives, web-based applets,)

10. The ability to modify and develop lessons that use technology tools for teaching algebra concepts (e.g. Graphing calculator, spreadsheets, computer algebra system (CAS), web-based applets,)

11. The ability to modify and develop lessons that use technology tools for teaching data analysis and statistics (e.g. Dynamic data analysis software, web-based applets)

7. Content Outline:

Historical overview of technology use in the mathematics classroom
Overview of current recommendations in the field related to the use of technology
Basic home screen and graphing features of a graphing calculator
Advanced graphing features (parametric equations, polar equations)
Characteristics of good lessons and strategies when using technology
Statistical regression features of graphing calculators
Calculator-based labs
Science connections
Symbolic manipulators
Incorporation of web based applets into lessons
Assessment issues when technology is used
Discussions of student developed lessons using the various technologies

8. Evaluation of Student Outcomes:

Required:

Students will develop a set of lessons, at least one from each of the technologies featured in the content outline above. The lessons may be developed as a part of a group exercise in integration of technology into appropriate secondary mathematics curricula. (AP #10 and 12)

This is a core assignment and students must have a passing score entered into the Chalk and Wire system in order to earn a passing grade for the course.

Each student will complete an interview exam with the instructor in which competence with various aspects of technologies may be demonstrated.

Optional assignments:

Reflective writing concerning on-line tutorials available for use with current technologies.
Reflective writing concerning videos watched related to teaching with technology.
Reflective writing concerning lab exercises related to technology
Programs resulting from lab exercise
Classroom presentations

9. **Grading Criteria:**

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Core assignment, technology lesson development</td>
<td>50% – 60%</td>
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<tr>
<td>Oral Interview exam</td>
<td>10% – 20%</td>
</tr>
<tr>
<td>Total of other assignments together</td>
<td>30% – 40%</td>
</tr>
</tbody>
</table>

The university approved plus and minus system for assigning grades will be used.

10. **Textbook(s) and Readings:**

There is no text as such. Students are required to complete readings from current journals that emphasize and highlight the use of technology in the teaching of mathematics at the secondary level. Extensive use will be made of web-based tutorials and application information.

11(a). **ADA Statement:** Students with disabilities are responsible for registering with the Office of Student Disabilities Services in order to receive special accommodations and services. Please notify the instructor during the first week of classes if a reasonable accommodation for a disability is needed for this course. A letter from the USF Disability Services Office must accompany this request.

11(b). **USF Policy on Religious Observances:**

Students who anticipate the necessity of being absent from class due to the observation of a major religious observance must provide notice of the date(s) to the instructor, in writing, by the second class meeting.

11(c). **A Reminder:**

In the event of an emergency, it may be necessary for USF to suspend normal operations. During this time, USF may opt to continue delivery of instruction through methods that include but are not limited to: Blackboard, Elluminate, Skype, and email messaging and/or an alternate schedule. It’s the responsibility of the student to monitor Blackboard site for each class for course specific communication, and the main USF, College, and department websites, emails, and MoBull messages for important general information.

11. **Please complete Attachment I (for College of Education files).**

Complete Attachment I, including the matrix by listing the (1) course objectives, (2) related topics, (3) evidence of achievement (including performance-based assessments, as appropriate) to be used to ensure that students have acquired the objectives, and identify the correlated Accomplished Practices (Attachment II), if applicable.

January 2010
Please respond to each of the following questions and complete the attached Matrix:

1. **Rationale for Setting Goals and Objectives:** What sources of information (e.g., research, best practices) support the formulation and selection of course goals and objectives.

   The National Council of Teachers of Mathematics (NCTM) published the Principals and Standards for School Mathematics in 2000. Technology was includes as one of 6 basic principles along with; Equity, Curriculum, Teaching, Learning and Assessment. This provides a view of the importance attached to technology in teaching mathematics. The Technology Principle states: "Technology is essential in teaching and learning mathematics, it influences the mathematics taught and enhances students' learning." (p. 24) More specifically; "Electronic technologies - calculators and computers - are essential tools for teaching, learning, and doing mathematics." (p. 24)

Specific list from last NCATE preparation from NCTM

1.6.2 Use computer software to explore and solve mathematical problems
2.4 Programs prepare prospective teachers who use a variety of resource materials such as software, print materials, technology, and activity files to enhance the learning of mathematics

3. Are there field-based experiences in this course? If so, please briefly indicate nature and duration.

   No

4. Is technology used in this course? If so, please briefly indicate type of technology and how it is used to manage, evaluate and improve instruction. Are students provided opportunities to access and/or demonstrate use of technology in instruction in this course? If so, please briefly describe.

   THE WHOLE COURSE REQUIRES / FEATURES A VARIETY OF TECHNOLOGY USES

5. List the specific competencies addressed from the Florida Adopted Subject Area Competencies, if applicable.

   While many of the lessons developed for this course have a basis in the high school mathematics competencies, they are not addressed in order to teach any of them, rather as topics to be taught well through the use of technology.

6. Are there any components of the course designed to prepare teacher candidates to help K-12 students achieve the Sunshine State Standards? If so, please identify.

January 2010
The entire course is designed to prepare secondary mathematics teachers who can use technology helping their grade 6 - 12 students meet the mathematics goals listed in the New Generation Sunshine State Standards. The particular emphasis is in the areas of algebra, statistics and working with data.

(Continued)
Complete the following matrix showing the association among (1) course objectives (item #6 of syllabus), (2) related topics, (3) evidence of achievement of objectives (including performance-based assessments, as appropriate), and (4) Accomplished Practices (Undergraduate and Plan II Master's Programs).

<table>
<thead>
<tr>
<th>Course Objectives</th>
<th>Topics</th>
<th>Evidence of Achievement</th>
<th>Predominant Accomplished Practices*</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Note: Objectives should be numbered 1.0, 2.0, 3.0, etc.)</td>
<td>What topics are used to fulfill each objective?</td>
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<tr>
<td>1.0 Knowledge of current research related to the use of particular technology</td>
<td>1.1 Overview of current recommendations in the field of technology use in mathematics classrooms</td>
<td>Classroom Discussions, Reflective Writing Assignments</td>
<td>#12 technology</td>
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<td>(graphing calculators, symbolic manipulators, calculator based labs (CBL), data</td>
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<td>analysis and statistics exploration software) for instruction in the mathematics</td>
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<td>classrooms.</td>
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<tr>
<td>2.0 Knowledge of issues related to technology use for mathematics learning and</td>
<td>2.1 Overview of current recommendations in the field of technology use in mathematics classrooms</td>
<td>Classroom Discussions, Reflective Writing Assignments</td>
<td>#12 technology</td>
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<td>teaching when technology is used as an integral part of instruction (e.g.</td>
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<td>advantages / disadvantages, affordances / hindrances of using particular</td>
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<td>technology tools.</td>
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<td>3.0 Use of technology “in the cloud” to collaborate with others on the teaching</td>
<td>3.1 Discussions of student developed lessons using the various</td>
<td>Lesson Set Assignment, Interview Performance Exam</td>
<td>#12 technology, #2 Communication</td>
</tr>
<tr>
<td>and learning of mathematics.</td>
<td>technologies</td>
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<td>4.0 Use of Power Point (or other presentation tools) to support the presentation of mathematics.</td>
<td>4.1 Discussions of student developed lessons using the various technologies</td>
<td>Lesson Set Assignment</td>
<td>Interview Performance Exam</td>
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<td>5.0 Competence on at least one model of graphing calculator.</td>
<td>5.1 Basic home screen and graphing features of a graphing calculator Advanced graphing features (parametric equations, polar equations) Characteristics of good lessons and strategies when using technology Statistical regression features of graphing calculators Calculator Based Labs (CBL)</td>
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| 8.0 Competence with technology tools for teaching data analysis and statistics (e.g. Dynamic data analysis software, web-based applets,) | 8.1 Characteristics of good lessons and strategies when using technology  
Statistical regression features of graphing calculators  
Incorporation of web based applets | Classroom Discussions  
Reflective Writing Assignments  
Lesson Set Assignment  
Interview Performance Exam | #12 technology |
|---|---|---|---|
| 9.0 The ability to modify and develop lessons that use technology tools for teaching Number Concepts (e.g. Web-based manipulatives, web-based applets,) | 9.1 Incorporation of web based applets | Classroom Discussions  
Reflective Writing Assignments  
Lesson Set Assignment  
Interview Performance Exam | #12 technology  
#10 planning |
| 10.1 The ability to modify and develop lessons that use technology tools for teaching algebra concepts (e.g. Graphing calculator, spreadsheets, computer algebra system (CAS), web-based applets,) | 10.1 Advanced graphing features (parametric equations, polar equations)  
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