I. Descriptive Information

A. Course Number and Title: EDSE 770 - Technology in Mathematics Education.

B. Course Description: The study of various topics related to the use of technology in the teaching of mathematics at the middle and secondary school levels. The use and integration of dynamic geometry, computer algebra, electronic spreadsheets, data analysis, and instructional software in mathematics are studied as well as the use of the Internet as a teaching tool.

C. Course Credit: Three (3) graduate hours

D. Prerequisites: none.

E. Intended Audience: Middle and secondary school teachers of mathematics.

F. Instructor: Dr. Edwin Dickey, Office: Wardlaw 226, Phone: 777-6235 or 777-8185, E-mail: Ed.Dickey@SC.edu.

II. Course Goals and Objectives

A. Goals

1. To familiarize mathematics teachers with appropriate and available computer software, Internet resources, and video materials useful in teaching mathematics.

2. To develop instructional techniques and strategies needed to use technology in mathematics instruction.

B. Objectives

The student will be able to:

1. develop a cooperative learning activity involving technology;

2. implement a constructivist's learning philosophy through the development of a discovery learning activity involving technology;

3. develop contextualized, alternative assessment strategies including portfolio and performance assessment;

4. use each of the following software applications for teaching mathematics:
   
   - geometry exploration software;
   - computer algebra system;
   - electronic spreadsheet;
   - data analysis software; and
   - Internet telecommunications tools.

5. identify instructional software appropriate for integrating into the mathematics curriculum.
III. Required Texts


IV. Academic Requirements

1. Class attendance.

2. Web-based Discussion Participation. Read and respond to questions and comments in the EDSE 770 web-based discussion area accessible through Blackboard (http://blackboard.sc.edu). You should check the discussion area once per week (at least once every other week) and respond as required. You are welcome to pose your own questions and comments.

3. Learning Activities involving Technology. Develop lesson plans and present learning activities involving two of the following applications: dynamic geometry, computer algebra systems, or electronic spreadsheets. At least one lesson must illustrate a discovery learning approach and at least one must employ some form of cooperative learning.

   Plan: Each activity should contain a teacher guide (at least 1 page) and a student worksheet (at least 2 pages). The teacher guide will include the name of the activity, the intended audience, instructional goals or objectives addressing appropriate state or national mathematics standards, needed materials (including software and hardware), and a description of the activity. Clearly describe how discovery learning or cooperative learning is incorporated into the lesson. The student activity sheet should be a structured set of instructions for students to follow and questions to be answered.

   Presentation: Briefly describe the activity you have developed and demonstrate one or more parts of the lesson to the class using a computer and projection device. (MT and MAT students currently enrolled in EDSE 778B will present lessons to students at their internship site and are excused from presenting to the EDSE 770 class. A more detailed description of this assignment for MT and MAT students can be found at the end of this syllabus.)

4. Instructional Software. Write a one page description of an instructional software package that you would use with students. One paragraph should describe the software and another should explain how you would use it for instruction. Present a brief (less than 5 minutes) highlight of the software to the class.

5. Internet Resource Page. Develop a web page that contains a brief description of you and a picture or graphic as well as an annotated list of at least three web resources useful to you as a mathematics teacher. Present a brief (less than 5 minutes) highlight of this web page to the class.

6. Performance Assessment Question and a Scoring Rubric. Write a performance assessment question using an appropriate context to assess an EDSE 770 student's ability to use what is taught in this course. Include a scoring rubric to measure various levels of achievement (at least 3). The question may be used on the final examination for this course.

7. Complete a Final Examination consisting of four or more performance tasks.
V. Administrative Requirements

Class participation is an important aspect of this course; students are strongly encouraged to attend each class. All written work is due on 22 April 2010 (Please make copies for each person in the class). Presentations are scheduled for 4 February, 18 February, 4 March, and 22 April. A draft performance task is due on 25 March. It will be returned to you with comments (but no grade) on 1 April. Your final performance task is due on 8 April. The Final Examination will be from 5:30 to 7:30 on 29 April.

VI. Evaluation

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Points</th>
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<tbody>
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<td>Web-based Discussion Participation</td>
<td>5</td>
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<tr>
<td>Learning Activity 1 Plan</td>
<td>15</td>
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<tr>
<td>Presentation</td>
<td>10</td>
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<td>Learning Activity 2 Plan</td>
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<tr>
<td>Presentation</td>
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<tr>
<td>Instructional Software Description</td>
<td>5</td>
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<tr>
<td>Presentation</td>
<td>5</td>
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<tr>
<td>Internet Resource Page Content</td>
<td>5</td>
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<tr>
<td>Presentation</td>
<td>5</td>
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<tr>
<td>Performance Assessment Task</td>
<td>10</td>
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<tr>
<td>Final Examination</td>
<td>15</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
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93-100=A  86-92=B+  80-85=B  76-79=C+  70-75=C  60-69=D  0-59=F

VII. Major Topics

1. Dynamic Geometry Software
2. Computer Algebra Systems
3. Electronic Spreadsheets
4. Data Analysis Software
5. Internet Resources
6. Instructional Software and Java Applets
VIII. Calendar

Lesson 1: Introduction to Course, Technology & Geometry
1/14/10 Lab: Blackboard, Sketchpad, TI-Nspire

Lesson 2: Dynamic Geometry Software
1/21/10 Lab: Complete Sketchpad Workshop Guide

Lesson 3: Classroom Uses of Geometry Software
1/28/10 Lab: Sketchpad Activities

Lesson 4: Computer Algebra Systems
2/4/10 Lab: TI-Nspire

Geometry Presentations

Lesson 5: CAS Skill Building
2/11/10 Lab: Complete TI-Nspire Tutorials

Lesson 6: Classroom Uses of CAS
2/18/10 CAS Presentations

Lesson 7: Spreadsheets
2/25/10 Lab: Complete Spreadsheet Activity (Excel or other)

Lesson 8: Classroom Uses of Spreadsheets
3/3/10 Spreadsheet Presentations

Lesson 9: Data Analysis Software
3/18/10 Lab: Fathom and WebStat

Lesson 10: Internet Resources
3/25/10 Lab: Identify Web and E-mail resources
Draft of Performance Task Due

Lesson 11: Developing a Web Page
4/1/10 Lab: Construct a Math Resource Web Page

Lesson 12: Using Java Applets for Mathematics Learning
4/8/10 Lab: Identify Java applet for use in mathematic instruction
Performance Task Due

Lesson 13: Instructional Software
4/15/10 Lab: Review instructional mathematics software

Lesson 14: Present: Internet Resource Page and Instructional Software
4/22/10 Lab: Finalize Web Page and instructional software critique
Written Work Due

Lesson 15: Final Examination (5:30-7:30 pm)
4/29/10
Lesson Presentations for MT and MAT Students Enrolled in EDSE 778B

Each student will present technology-based lessons as part of his or her internship (you will be exempted from presenting to the EDSE 770 class). Because hardware and software resources will vary from school to school, adjustments to this assignment will be considered. The College of Education ETC and I will consider loaning hardware or software to support your plans, but we prefer that you use the resources available at the school.

By 1/28/2010, you must submit a Description of Technology Resources and a tentative Plan for presenting your lessons.

Description: The description of resources will include:
(1) a list of computer(s), calculators, and video equipment (including projection) available in your classroom;
(2) a description of any computer lab that is available to you; and
(3) a list of computer software available at the school for teaching mathematics.

Technology Resources for Checkout: The ETC possesses several resources available for you use as part of your internship and for this assignment. TI-73, TI-83, and TI-89 calculators (at least 15) as well as a few TI-Nspire are available for checkout. A mobile set of laptop computers with wireless Internet access and software such as Derive, Excel, and Geometers Sketchpad is available for checkout and use in schools. Digital video still and motion cameras are also available. All reservations for equipment must be placed 48-hour before pick up. You may reserve the equipment through the College of Education Office of Instructional Support Request Form (http://www.ed.sc.edu/ois/instructionSupport.asp). You are responsible for picking up and returning the equipment.

Plan: The tentative plan for teaching two technology-intensive lessons should follow the general guidelines in the Learning Activities involving Technology section above. You may do a primarily graphing calculator lesson as part of the CAS lesson. The geometry and spreadsheet lesson must be computer-based (a TI-Nspire will be considered a computer). Your plan should include for both lessons:
(1) the type (geometry, CAS, or spreadsheet);
(2) the subject, period, time of day, and number of students);
(3) the approximate date ("the week of ..." is fine);
(4) your hardware and software needs, and
(5) a short paragraph describing the lesson.

By 2/25/2010, you should submit the dates and time for the two lesson presentations. The two lesson presentations must be completed by 4/27/2010 with me (or someone designated by me) observing each of the two lessons.

MT Comprehensive Examination and MAT Education Component Comprehensive Examination:

MT and MAT degree candidates must submit your MT/MAT Portfolio by 30 April 2010 that includes four sections:
1. A reflection paper that addresses how the MT or MAT program and its internships provide you with research-based ideas and school-based experiences to prepare you to be an effective teacher of mathematics.
2. An explanation with at least 3 artifacts of your creation during the program in support of how the USC Conceptual Framework (http://www.ed.sc.edu/ncate/Documents/CFText.pdf) element titled Theory and Research has been addressed in your MT program with attention to effective teaching that requires understanding what students know and need to learn.
3. An explanation with at least 3 artifacts of your creation during the program in support of how the USC Conceptual Framework element titled Diversity has been addressed in your MT program with attention to the principle of equity: high expectations and strong support for all students.
4. An explanation with at least 3 artifacts of your creation during the program in support of how the USC Conceptual Framework element titled Decision-Making has been addressed in your MT program with attention to how you use stimulating curricula and promote learning with understanding.