EDSE 770
Technology in Mathematics Education

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 videodisc 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 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**

Technology in Mathematics Education. Dickey, Ed. USC, 2012. Available in Blackboard (The Russell
    House Copy Shop will make a bound, hard copy for a reasonable price).

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, needed materials (including software and hardware), and a description of the activity.
    Clearly describe how discovery learning or cooperative learning in 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 a 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
    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. Requirements #3, 4, and 5 above are due on 18 April 2012 (provide electronic versions of the Lesson Plans so that they may be posted on Blackboard). Presentations are scheduled for 1 February, 15 February, 29 Feburary, and 18 April. A draft performance task is due on 21 March. It will be returned to you with comments (but no grade) on 28 March. Your final performance task is due on 4 April. The Final Examination will be from 5:30 to 7:30 on 2 May 2012.

VI.   **Evaluation**

Requirement		*Points*
Web-based Discussion Participation		5
Learning Activity 1	Plan	15
	Presentation	10
Learning Activity 2	Plan	15
	Presentation	10
Instructional Software Description		5
	Presentation	5
Internet Resource Page Content		5
	Presentation	5
Performance Assessment Task		10
Final Examination		15
Total		**100**

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
1/11/12   Lab: Blackboard, Sketchpad, TI-Nspire

Lesson 2:   Dynamic Geometry Software
1/18/12   Lab: Complete Sketchpad Workshop Guide

Lesson 3:   Classroom Uses of Geometry Software
1/25/12   Lab: Sketchpad Activities

Lesson 4: Computer Algebra Systems
2/1/12   Lab: TI-Nspire
            Geometry Presentations

Lesson 5:   CAS Skill Building
2/8/12   Lab: Complete TI-Nspire Tutorials

Lesson 6:   Classroom Uses of CAS
2/15/12   **CAS Presentations**

Lesson 7:   Spreadsheets
2/22/12   Lab: Complete Spreadsheet Activity (Excel or other)

Lesson 8:   Classroom Uses of Spreadsheets
2/29/12   **Spreadsheet Presentations**

Lesson 9:   Data Analysis Software
3/14/12   Lab: Fathom and WebStat

Lesson 10: Internet Resources
3/21/12   Lab: Identify Web and E-mail resources
            Draft of Performance Task Due

Lesson 11: Developing a Web Page
3/28/12   Lab: Construct a Math Resource Web Page

Lesson 12: Instructional Software
4/4/12   Lab: Review instructional mathematics software
            Performance Task Due

Lesson 13: Using Java Applets for Mathematics Learning
4/11/12   Lab: Identify Java applet for use in mathematic instruction

Lesson 14: **Present: Internet Resource Page** and **Instructional Software**
4/18/12   Lab: Finalize Web Page and instructional software critique
            Written Work Due

Lesson 15: **Final Examination** *(5:30-7:30 pm)*
5/2/12

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 **1/25/2012**, 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 College of Education possesses several resources available for you use as part of your internship and for this assignment. I can provide some TI-Nspire CAS caclulators.. The Office of Instructional Support has a mobile set of laptop computers with wireless Internet access and software such as Excel, and Geometers Sketchpad 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 **2/22/2012**, you should submit the dates and time for the two lesson presentations. The two lesson presentations must be completed by **4/27/2012** with me (or someone designated by me) observing each of the two lessons.

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MT Comprehensive Examination and MAT Education Component Comprehensive Examination:

MT and MAT degree candidates must submit your MT/MAT Portfolio by **27 April 2012** 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/CFHandout.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.