The University of Tennessee at Martin
Department of Educational Studies
Fall, 2003
Course Syllabus

Instructor: Dr. James Petty
Office: 240J Gooch Hall
Phone: 587-7496

I. Course Number and Title

Secondary Education 412
The Teaching of Mathematics in the Secondary School

II. Semester Credit Hours/Prerequisites

3 Credit Hours
Teacher Education 301, 302, and Admission to Teacher Education

III. Catalog Description/Purpose

This course is designed to develop strategies, techniques, materials, planning skills, and evaluation skills appropriate for the teaching of high school mathematics. Moreover, the student will apply the above abilities and strategies in a microteaching situation. Prerequisite: TCED 301, TCED 302.

Rationale

The approved program for the preparation of secondary mathematics teachers includes subject content, professional educational and supervised teaching in a public high school. This course integrates the professional education component with the content prior to the student teaching experience by providing the pre-service teacher with the opportunity to develop the necessary techniques and strategies for instructing high school mathematics students. Furthermore, the microteaching component of the course will provide the student with an opportunity to assess their own teaching skills in a directed teaching environment.

V. Teacher Education Model

The UTM Teacher Education Program is designed to develop teachers who become facilitators of learning by participation in activities and methods designed to encourage active learning where students become immersed in best practice as a way to strengthen skills and professionalism in teaching. The UTM Teacher Education Program is based on a conceptual framework that is derived from current research and best practice.

The following components represent the knowledge and skills a facilitator of learning is expected to develop. Those components that are highlighted are the ones this course expressly teaches to:

A. Higher Order Thinking Skills
B. Reflection/Relevance and Purpose
C. Communication
D. Pedagogy
E. Cultural Diversity
F. Assessment
G. Collaboration
H. Technology
I. Professionalism

VI. Goals/Objectives

General Goals:

Each Student will:

1. learn to develop acceptable expectations and goals for students at the secondary grade levels. (Conceptual Framework: B. D. F.)

2. develop the appropriate knowledge and skills for developing lesson plans and activities for teaching secondary mathematics. (Conceptual Framework: A. B. D.)

3. develop the knowledge and skills for effective teaching based upon research into the learning and teaching of mathematics. (Conceptual Framework: B. D. H.)

4. demonstrate and model effective oral and written communication skills. (Conceptual Framework: B. C. D.)

5. demonstrate his/her knowledge of current trends, standards, goals and technology used in the teaching of secondary mathematics. (Conceptual Framework: B. D. H.)

6. demonstrate a knowledge of a variety of effective strategies to utilize in planning.(Conceptual Framework: A. B. D. H.)

7. plan and be able to carry out meaningful and varied daily classroom activities relevant for the teaching of secondary mathematics in a culturally diverse classroom. (Conceptual Framework: B. D. E.)

8. demonstrate the ability to identify, construct, and effectively utilize hands-on activities in planning units or daily lesson plans. (Conceptual Framework: B. D. C. F.)

9. demonstrate his/her ability to adapt the pace and level of classroom activities to the cognitive ability level of each student. (Conceptual Framework: B. D. E. F.)

10. demonstrate his/her ability to plan, design, and implement evaluation procedures, utilizing informal, formal, formative and summative assessment techniques, to assess student learning. (Conceptual Framework: A. B. C. D. F. G.)

11. understand the importance of providing special instruction for students with special needs, such as handicapped, gifted or talented, learning disabled, and minorities, in secondary mathematics. (Conceptual Framework: B. D. E. F.)

12. demonstrate his/her ability to incorporate problem-centered instruction, graphing calculators, and microcomputers in the teaching of secondary mathematics. (Conceptual Framework: B. D. H.)

VII. Course Content and Activities

1. Problem Solving, Problem-Centered Instruction and NCTM Standards. Emphasis will be placed on identifying, creating, and implementing the NCTM Standards in the Secondary Mathematics Classroom.

2. Using Manipulatives, Hands-On Activities, and Active Student Involvement. Emphasis will be placed on understanding increasing levels of abstraction and the purpose for using materials appropriate for each student. The appropriate grade level and the need for active participation by students are discussed.

3. Designing Unit and Daily Lesson Plans.
The student will learn to design problem-centered unit and lesson plans. The student will then simulate the implementation of these plans in a microteaching environment.

4. Methods and Strategies for Mathematics Instruction.
The student will develop a variety of methods and strategies for the instruction of mathematics at the secondary level. Major emphasis will be placed on combining these methods and strategies within a problem-centered environment.

5. Directed Teaching Experience.
The student will be provided with opportunities to practice teach in a simulated microteaching environment. These lessons will be based upon each student's approved lesson plan. Each student will be required to video-tape and critique at least one of his/her simulated teaching experiences.

6. Measurement and Evaluation.
Through examples, research, and class discussion students will develop the knowledge necessary for implementing a variety of evaluation techniques.

7. Using Graphing Calculators in the Secondary Classroom.
Through demonstration and hands-on experience students will learn to effectively utilize the graphing calculator in the class room. At least one of the lesson/unit plans will be devoted to this technology.

8. Using Computer Software to Teach or Enhance Mathematics Instruction.
Through demonstration and hands-on experience students will learn to effectively utilize the microcomputer and appropriate software in the classroom. At least one of the lesson/unit plans will be devoted to this technology.

9. Adapting Instruction to Differences in Learning Style, Cultural and Ethnic Differences, and Gender Bias in the Classroom. Through reading, class discussion, research and observation students will learn to adapt instructional goals, objectives, and activities to meet the needs of all secondary mathematics students. Students will learn through readings, discussion and observation to identify and correct bias towards students based upon cultural, ethnic, and gender differences.

10. Organization of Classroom and Materials; Development and Utilization of Audio-Visual Aids. Students will learn through observation and discussion the importance of organization of the classroom, materials

being utilized, and cooperative groups in teaching mathematics at the secondary level. Students will also learn to utilize a variety of audio-video equipment and materials through hands-on experience.

Individual Activities:

1. Lesson and Unit Plans: 200 points
   Each student will construct 10 lesson plans and 1 unit plan based upon the following criteria:

   lesson plan 1 - 20 minute direct instruction or lecture format on any topic

   lesson plan 2 - Revision of lesson 1 providing for student involvement and interaction

   lesson plan 3 - using algebra tiles or balance scales to teach algebra

   lesson plan 4 - using hands-on materials to connect algebraic and geometric concepts

   lesson plan 5 - using hands-on materials, cooperative groups, and active student involvement to teach informal geometry

   lesson plan 6 - problem-centered activity for teaching Euclidean geometry and the structuring of proofs

   lesson plan 7 - problem-centered activity utilizing the graphing calculator to teach any algebra, statistics, geometry, trigonometry, calculus or number theory topic

   lesson plan 8 - problem-centered activity integrating the history of mathematics to any secondary mathematics topic

   lesson plan 9 –

2. Examinations - 250 points
   There will be midterm and comprehensive final examinations.

3. Out-of-class Activities - 25 points
   a. Lesson Plans
   b. Unit Plans
   c. Unit Tests
   d. Develop Teaching Aids and Materials

4. In-class Activities - 25 points
   a. Discussions
   b. Critiqued Directed Teaching
   c. Development and Operation of Visual Equipment and Instructional Aids

5. Microteaching and Directed Teaching Experiences - 100 points

Group Activities:

1. Unit Plan
   Group project designed to incorporate a variety of teaching strategies and methods; individual learning and/or cultural differences; and utilization of technology over an approved Topic at the secondary grade level of interest to the students.

2. Field Experience
   Students will be provided the opportunity to work with a variety of secondary mathematics students and to teach at least two lessons in a secondary mathematics classroom.

Grading Scale:

A => 450 to 500 points
B => 400 to 449 points
C => 350 to 399 points
D => 300 to 349 points
F => Below 300 points

VIII. TEXTBOOK (Recommended)

Posamentier, Alfred S., and Stepelman, Jay. Teaching Mathematics in the Secondary School. Merrill Publishing Company, 2002.

Supplemental Reading Materials are handed out in the class.

Reference List

1. Butler, Charles H., and Wren, F. Lynwood (1965). The Teaching of Secondary Mathematics, 4th edition. New York: McGraw-Hill.

2. Callahan, Joseph F., and Clark, Leonard H (1988). Teaching in the Middle and Secondary Schools, 3rd edition. New York: Macmillan Publishing Company.

3. Cangelosi, James S. (1992). Teaching Mathematics in Secondary and Middle School--Research-Based Approach. New York: Macmillan Publishing Company.

4. Clark, Leonard H., and Starr, Irving S. (1988). Secondary and Middle School Methods, 5th edition. New York: Macmillan Publishing Company.

5. Dossey, John A., Mullis, Ina V.S., Lindquist, Mary M., and Chambers, Donald L. (1988). The Mathematics Report Card. Princeton NJ: Educational Testing Service.

6. Duke, Daniel L. (1990). Teaching: An Introduction. New York: McGraw-Hill.

7. Farrell, Margaret A., and Farmer, Walter A. (1988). Secondary Mathematics Instruction--An Integrated Approach. Providence, RI: Janson Publications, Inc.

8. Johnson, Donovan A., and Rising, Gerald R. (1972). Guidelines for Teaching Mathematics, 2nd edition. Belmont, CA: Wadsworth Publishing.

9. Kauchak, Donald P., and Eggen, Paul D. (1989). Learning and Teaching: Research-Based Methods. Boston, MA: Allyn and Bacon Publishing.

10. Kim, Eugene C., and Kellough, Richard D. (1987). A Resource Guide for Secondary School Teaching, 4th edition. New York: Macmillan Publishers.

11. Martin, Ralph E., Wood, George H., and Stevens, Edward W. (1988). An Introduction to Teaching. Boston, MA: Allyn and Bacon Publishing.

12. National Council of Teachers of Mathematics (1996). Addenda Series—Grades 9 - 12: A Core Curriculum. Reston, VA: NCTM.

13. National Council of Teachers of Mathematics (1992). Addenda Series-- Grades 9 - 12: Data Analysis and Statistics. Reston, VA: NCTM.

14. National Council of Teachers of Mathematics (1993). Assessment in the Mathematics Classroom: 1993 Yearbook. Reston, VA: NCTM.

15. National Council of Teachers of Mathematics (1989). Curriculum and Evaluation Standards for School Mathematics. Reston, VA: NCTM.

16. National Council of Teachers of Mathematics (1991). Professional Standards for Teaching Mathematics. Reston, VA: NCTM.

17. Orlich, Donald C., et. al. (1990). Teaching Strategies, 3rd edition. Lexington, MA: Heath Publishing Company.

18. Reisman, Fredricka K. (1981). Teaching Mathematics, 2nd edition. Boston, MA: Houghton Mifflin.

19. Smith, Margaret, and Silver, Edward A. (1995). Meeting the challenges of diversity and relevance. Mathematics Teaching in the Middle School, 1 (6), 442-448.

20. Stein, Marcy, Silbert, Jerry, and Carnine, Douglas (1997). Designing Effective Mathematics Instruction: A Direct Instruction Approach, 3rd edition. Upper Saddle River, NJ: Prentice Hall, Inc.

21. Thomas, David A. (1992). Teenagers, Teachers, and Mathematics. Needham Heights, MA: Allyn and Bacon Publishing.

22. Travers, Kenneth T., et. al. (1977). Mathematics Teaching. New York: Harper and Row.