Course Overview

“...the future well being of our nation and people depends not just on how well we educate our children generally but on how well we educate them in mathematics and science specifically. ...the most powerful instrument for change and therefore the place to begin lies at the very core of education – with teaching itself.” Before It’s Too Late.

“We live in a time of extraordinary and accelerating change. New knowledge, tools, and ways of doing and communicating mathematics continue to emerge and evolve. Calculators, too expensive for common use in the early eighties, now are not only commonplace and inexpensive but vastly more powerful. Quantitative information available to limited numbers of people a few years ago is now widely disseminated through popular media outlets.

The need to understand and be able to use mathematics in everyday life and in the workplace has never been greater and will continue to increase. For example:
• **Mathematics for life.** Knowing mathematics can be personally satisfying and empowering. The underpinnings of everyday life are increasingly mathematical and technological. For instance, making purchasing decisions, choosing insurance or health plans, and voting knowledgeably all call for quantitative sophistication.

• **Mathematics as a part of cultural heritage.** Mathematics is one of the greatest cultural and intellectual achievements of human-kind, and citizens should develop an appreciation and understanding of that achievement, including its aesthetic and even recreational aspects.

• **Mathematics for the workplace.** Just as the level of mathematics needed for intelligent citizenship has increased dramatically, so too has the level of mathematical thinking and problem solving needed in the workplace, in professional areas ranging from health care to graphic design.

• **Mathematics for the scientific and technical community.** Although all careers require a foundation of mathematical knowledge, some are mathematics intensive. More students must pursue an educational path that will prepare them for lifelong work as mathematicians, statisticians, engineers, and scientists.” (NCTM, 2000, p. 4)

Mathematics has played a key role in the development of the world that we know, in the ways people think about the world in which they live, and the ways they develop and use models to analyze that world. The role of mathematics can be visible, as in the development and applications of computer technology, or it can be underlying the principles of design, discourse, and functionality of a process or product, as in the world of finance, medicine, or transportation. Mathematics has been called the language of science—and its use in the service of other disciplines is critical—but mathematics exists as a discipline in itself and is a rich field of study of the properties and relationships among and between numbers, shapes, chance, and change.

Teaching mathematics is enabling students to understand the principles and concepts of mathematics, to share in the intellectual challenges and gratification that come with knowing mathematics, and to apply the mathematics they have learned to solve problems that matter. Teaching involves not only knowing mathematics but also understanding how to help others come to know mathematics.

In this course you will be provided with opportunities to:

• Have a variety of interactions with teachers and students in a school setting;
• Experience teaching including the variety of tasks teachers actually do in the act of teaching;
• Critically reflect on the link between university based conversations about mathematics teaching and learning and school based practice;
• Reflect on the content of secondary school mathematics;
• Consider what mathematical knowledge teachers need to know to teach well;
• Develop an understanding of what it means to teach;
• Reflect on the role of mathematics in a diverse society;
• Consider generally what it means to move from novice to expert and specifically how teachers come to understand where students are in their development.

The seminar will be organized around the Principles from the *Principles and Standards for School Mathematics* (NCTM, 2000). The six Principles—Equity, Curriculum, Teaching,
Learning, Assessment, Technology—outline intersecting frames for thinking about the goals of mathematics teaching and learning. The Principles describe critical issues that are integral to teaching: providing challenge and support for learning, selecting curriculum tasks and materials, planning instructional units and lessons, designing assessments. They characterize the learning of mathematics as active, focused on developing understanding of important mathematical ideas, and supported by the effective use of technology. The Principles will be introduced at the beginning of the year to provide a broad context in which teaching and learning take place.

While individual Principles will frame our early discussions, the underlying connections among them will be important. Our conversations will be grounded by activities that teachers do as they engage in the act of teaching, (e.g., assessing student work, modifying problems, designing lessons, asking and answering questions). Specific subject matter - algebra, geometry, measurement, number, and data analysis and probability - will be embedded within our consideration of the Principles and by the end of the year, you will have had the opportunity to reflect on secondary mathematics content and its connections to the elementary curriculum.

It is our responsibility to inform you that student coursework will used to contribute to ongoing teacher development research. This work will include students’ written assignments and videotapes of TE 401/2 classroom episodes. Protocols for ensuring that this is done in accordance with appropriate procedures will be discussed in class. At no time will students’ names be used in any published reports, and students will be free to withdraw their consent at any time.

**TE 401**

Our inquiry in the first semester (TE 401) will center on the Teaching and Learning Principles. We will investigate the connections between these principles and the relationship between these principles and Equity, Curriculum, Assessment, and Technology. Conversations will be driven in each case by considering several essential questions that relate directly to the course goals.

- **The Learning Principle.** Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge (NCTM, 2000, p. 16).
  - What strategies can teachers use to enable students to learn mathematics with understanding?
  - What does it mean to learn mathematics with understanding?
  - What are the roles of conceptual understanding and procedural fluency?
  - How do teachers and students in secondary school conceptualize mathematics and the teaching and learning of mathematics?

- **The Teaching Principle.** Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well. (NCTM, 2000, p. 16)
  - What do teachers need to know about mathematics and about their students to teach mathematics for understanding?
  - What is the nature of the mathematics being taught?
How do university-based conversations about mathematics teaching and learning and school practices inform one another?
What is the range of roles, behaviors, responsibilities, and obligations that constitutes being a teacher?

- **The Equity Principle.** Excellence in mathematics education requires equity—high expectations and strong support for all students (NCTM, 2000, p. 16).

Equity is interwoven throughout the other principles in a fundamental way and will be considered in those discussions as well dedicating class time to what it means to teach diverse students in a diverse society. Specific questions with an equity focus are:
  - How do teachers and students in secondary school conceptualize mathematics and the teaching and learning of mathematics?
  - How do these conceptualizations vary across contexts?
  - What is the range of roles, responsibilities, and obligations that constitutes being a teacher?
  - What role does mathematics play in school, in society, and as way of understanding the world?

- **The Technology Principle.** Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning. (NCTM, 2000, p.16)

Technology is interwoven with each of the other principles and will be an integral component in those discussions, including the specific role of technology in relation to teaching and learning mathematics.
  - How does technology affect the mathematics being taught?
  - How does technology affect the role of the teacher?
  - How can technology be used to enhance student learning?

**TE 402**
In 402, the focus for our inquiry will turn to the Curriculum and Assessment Principles. Our goal is to understand who we as teachers are and what we as individuals know and believe about teaching and about mathematics. Our focus will be on addressing the following four questions in the context of these Principles.
  - What should students learn? (the intended curriculum)
  - What actually gets taught? (the actual curriculum)
  - What do students learn? (the learned curriculum)
  - Who learns what?

- **The Curriculum Principle.** A curriculum is more than a collection of activities: it must be coherent, focused on important mathematics, and well articulated across the grades (NCTM, 2000, p. 16).
  - How do teachers and students in secondary school conceptualize mathematics and the teaching and learning of mathematics?
What is the nature and value of the mathematics being taught?

- **The Assessment Principle.** Assessment should support the learning of important mathematics and furnish useful information to both teachers and students (NCTM, 2000, p. 16).
  - How do university-based conversations about mathematics teaching and learning and school practices inform one another?
  - What strategies can teachers use to enable students to learn?
  - How do teachers assess what understandings students have?

**Attendance Policy**

Attendance matters. It matters to us as instructors; it matters to peers who count on your support and feedback. It also matters to your mentor teacher and to your continued progress in this Program.

*At MSU courses:* We expect you to attend all class sessions of TE 402 including sessions in content area literacy and in your minor. You will receive only one grade for TE 402, and attendance in all its various session types has implications for that grade. Absences for which you have not pre-notified your instructor or absences that we discuss together after the fact but cannot accept as valid become "unreasonable" absences. **More than two unreasonable absences may result in a 0.0 for the course.**

If you know you are going to miss a class, talk with one of us prior to that time. Make a plan for getting a record of that session. Help us understand why the absence is necessary. If a serious illness strikes you more suddenly, call one of the instructor’s office and leave a message. Voice mail will record your message even after hours. Then, when you're feeling cogent, call either of us and explain your absence more fully. We will tell you if we are unable to see your absence as reasonable.

*At your school placement:* **Here again, more than two unreasonable absences (or reasonable absences that you do not make up) may result in a 0.0 for the course.** When you meet your mentor teacher, agree on a procedure for notifying her/him of an impending or sudden absence. Also report your absence when you turn in your next field report. Field visits are scheduled to end at April 19. The period between April 19 and the end of the term can be used, if necessary, to make up field visits and assignments that you missed earlier in the term.

**Course Assignments, Grading and Participation**

**Required Elements**

In the Fall Semester 2002, this course includes three required elements:
- the subject-specific seminar that you attend **Mondays and Wednesdays, 4:10 to 6:00 p.m.;**
- teaching lab sessions that are coordinated with the subject-specific seminar. A teaching lab syllabus will be distributed during the first lab session; and
• fieldwork practicum, including standards for reliability and responsibility, communication skills and social relationships, and comfort with and concern for the learning of all children as described below and in your senior handbook.

During the Spring 2003 semester, students are required to attend two six-week seminars, one in special education, and the other in the student’s teaching minor. Information related to these sessions will be discussed at the end of the Fall Semester.

**ALL of these components must be completed successfully for you to pass the course. If you fail to complete any of these components, you will receive a grade of 0.0 or Incomplete for the course. If you complete all of the components successfully, your grade will be determined by your performance in the subject-specific seminar, field placement, and teaching laboratory experience.**

**Course Assignments**

Coursework in TE 401/402 is organized around four major strands. Several of the larger assignments (e.g., mathematics education autobiography), while grouped under individual projects below, cut across strands in scope and substance, and may influence the grading of more than one project. On the whole, these strands represent important transitions and challenges related to learning to teach mathematics. The relative weight for each strand is listed below.

**Strand Zero: Course Expectations (10% of course grade)**

1. Course participation (assessed through preparation for class meetings, participation in discussions and other course activities, disposition as an active learner)
2. Peer support (assessed through active participation in group tasks, contributions to peer improvement, and honest/thorough peer assessment)
3. Inquiry stance (assessed through questions posed, comfort with uncertainty, willingness to take appropriate risks)

**Strand One: Self as Teacher (30% of course grade)**

1. Mathematics Education Autobiography
2. Record of Practice/Milestone Mondays
3. “Teacher Beliefs” activities
4. Personal Teaching Metaphor
5. Fall Portfolio Entry: “Reflections on Participation”

**Strand Two: Knowing and Learning Mathematics (25% of course grade)**

1. Mathematics Content Problems (assessed based on completion of weekly problems, contributions to problem discussions)
2. Field Assignment Classroom task prompt
3. “Evidence of Learning” activities
4. “Student assessment” activities
5. Student Case Study

**Strand Three: Teaching Mathematics to All Students (35% of course grade)**

1. Teaching Lab (assessed based on participation in all elements of teaching lab sessions—preparation, teaching, discussions, reflections)
2. “Teaching Mathematics” quick writes
3. Fieldwork assignments (teacher interview, classroom environment prompt, school curriculum report)
4. Mathematics Content Problem teaching (Some students will complete this requirement in TE 402)
5. Initial lesson plan
6. Teaching Episode 1

Grading
Student grades will be based on the quality of written and oral assignments and on active and critical participation in class. Because of the varied nature of the assignments in TE 401/2, specific assignments will be assessed using different criteria. General criteria for assignments receiving a $\sqrt{-}$, $\sqrt{\,}$, or $\sqrt{+}$ (these are generally smaller assignments) are listed below.

$\sqrt{+}$ Reflective, highly thoughtful, integrates “theory” and “practice,” clear, focused, well supported with examples and/or connections across course experiences, and free of mechanical errors. (for mathematics content problems—solution is correct and supported by clear reasoning, process is documented)

$\sqrt{}$ Analytic, thoughtful, clear, focused, mostly well supported, and free of mechanical errors. (for mathematics content problems—solution is mostly correct or support is incomplete, process is documented)

$\sqrt{-}$ Descriptive, suitable, adequately supported, with minimal mechanical errors. (for mathematics content problems—solution is not correct, limited support is provided, process is unclear)

“0” Incomplete, vague, disorganized, and poorly supported. Mechanical errors impair fluency. (NOTE: Assignments receiving a “0” may have to be revised to complete specific course requirements.)

For assignments receiving a numerical (1-4) grade, specific assignment criteria, along with rubrics or other assessment guidelines will be distributed when the assignments are introduced or developed in class shortly thereafter.

In all cases, students will have the right to revise and resubmit work for additional consideration within one week after receiving the graded paper. A pattern of late or incomplete assignments will be interpreted as a lack of professional responsibility and reliability and may prevent progression to the internship year.

Progression to Internship Year
If you are not meeting these criteria, you will be notified and given a chance to correct your deficiencies.

(1) Reliability and Responsibility
Prospective interns must generally have been present and on time for professional commitments, including classes and field experiences. Prospective interns must have regularly communicated about necessary absences or lateness according to the guidelines in the Professional Conduct Policy. Prospective interns must have a record of meeting deadlines for course assignments and program requirements. A pattern of repeated absences, lateness, and failure to meet deadlines in
courses or fieldwork is not acceptable. Any form of dishonesty (indicated by documented evidence) about these and other requirements, including lying, stealing, plagiarism, forged signatures, etc., is not acceptable.

(2) Communication Skills and Social Relationships
Prospective interns must have demonstrated the ability to express their viewpoints and negotiate difficulties appropriately, without using offensive language with instructors or peers. Prospective interns must have shown that they are ready to accept constructive feedback in a professional manner. Prospective interns must have an awareness of appropriate social boundaries between students and teachers and have shown that they are ready and able to observe those boundaries. Extreme forms of behavior (including outbursts in class, personal or sexual harassment, threats of suicide or of harm to others) are not acceptable.

(3) Comfort with and Concern for the Learning of all Children
Prospective interns must be able to engage in informal conversations with children and keep their attention in such conversations. Prospective interns must interact courteously, fairly, and professionally with people from diverse racial, cultural, and social backgrounds and of different genders or sexual preferences. Acts of disrespect to others (including racial slurs, judgmental statements about families, and prejudicial treatment of students) are not acceptable.

(4) Academic Honesty
Article 2.3.3 of the Academic Freedom Report states that "the student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." TE 401/402 adheres to the policies on academic honesty as specified in General Student Regulations 1.0, Protection of Scholarship and Grades, and in the all University Policy on Integrity of Scholarship and Grades, which are included in Spartan Life; 2001 Student Handbook and Resource Guide. Students who violate these codes may, at a minimum, receive a 0.0 on the assignment or fail the course.

Technology requirements and course assignments
Successful completion of 401/402 satisfies the state requirement for technology competency. Your assigned work for this course will require you to have the following skills: using the web for processing class work, finding web based resources for class work, facility with email including sending and receiving attachments, word processing, using database and spreadsheet software. Course expectations include the ability to work use Blackboard to access course materials and turn in course assignments. The Blackboard address is below; your password is your Pilot user id, and your Pilot email password is your password for Blackboard. http://blackboard.msu.edu/courses/fs02te401017/

If you do not have all the skills you need, tech resources are available both within the College as well as the larger MSU community. Among the most useful resources are the Tech-Guides. They are available to help you work through any problems you have with technology, and are particularly focused on educational uses of technology. They can help you with basic e-mail to developing web pages and beyond. Contact the Tech-Guides by phone at 432-3531 or by stopping in at the TEC (133 Erickson Hall) during their posted hours.
The Tech-Guides also offer group workshops, and colloquia. Information about these events can be found at their website (http://ott.educ.msu.edu/tec). Workshops can be scheduled by special arrangement for groups of 8 or more students. Call the Tech-Guides to arrange a time.

Another resource is CBT (Computer Based Training) on the web (http://cbtraining.msu.edu). CBT offers hundreds of computer related, self-paced tutorials. While the vast majority of the CBT courses are for more advanced and specialized areas than most Education students will want, there are tutorials for Microsoft Office (Word, Excel, Access, PowerPoint), Netscape, and Web Authoring (HTML, Authoring Tools, JavaScript, etc.).

**Course Texts/References**


Other readings will be distributed via Blackboard

**References in Main Library**
National Board for Professional Teaching Standards (1999). Middle Childhood through Early Adolescence/Mathematics Standards 7-15

National Board for Professional Teaching Standards (2000). Adolescence and Young Adulthood/Mathematics Standards
