George Mason University
EDCI 372: Teaching Mathematics in the Secondary School

Instructor: Toni M. Smith, Ph.D.
E-mail: tsmith10@gmu.edu
Phone: 571-993-5081
Office: Commerce II, room 113A

Office Hours: Tuesdays 5:30-7:00 pm; and by appointment
Class Meets: Tuesdays 7:20-10:00 pm

Students learn mathematics through the experiences that teachers provide. Thus, students' understanding of mathematics, their ability to use it to solve problems, and their confidence in, and disposition toward, mathematics are all shaped by the teaching they encounter in school.

Teaching mathematics well is a complex endeavor, and there are no easy recipes for helping all students learn or for helping all teachers become effective. Nevertheless, much is known about effective mathematics teaching, and this knowledge should guide professional judgment and activity.

(NCTM, 2000, pp. 16-17)

Purpose of the Course
As a future secondary mathematics teacher, you have the opportunity to touch the future. You can play an important role in the development of adolescents and have an influence on the way in which they come to understand the world in which they live. You can help students to develop strong understandings of mathematics and its uses, understandings that are foundational for work beyond high school. What a wonderful career you have chosen! ☺

In this course, you will come to develop knowledge, skills and understandings that will be useful to you in your work as a secondary mathematics teacher. Though there are no "easy recipes" for helping students learn mathematics, research has identified *characteristics* of effective mathematics teaching. Throughout the semester, we will explore these characteristics and ways in which you can incorporate them into your teaching. You will learn how to be reflective about your work and that of other teachers so that you can continue to draw on and build upon the knowledge and understandings you gain in this course throughout your career as a secondary mathematics teacher.

Course Description as provided in the Course Catalog
This course emphasizes developing different styles of teaching and covers curricula, current issues, and research literature in secondary school mathematics. School-based field experience required. This course is for students who have already taken or are concurrently taking EDUC 322/522.

Guiding Questions
To achieve the specified purpose of the course, we will consider the following questions throughout the semester:

1. What does it mean to *do* mathematics?
2. What does it mean to be *proficient* with mathematical content?
3. How do individuals learn mathematics?
4. What does it mean for an adolescent to deeply understand ___*(insert math topic/concept)*__?
5. What tasks would facilitate the development of deep understanding of __*(insert math topic/concept)*__?
6. What characteristics of the classroom environment promote the development of strong understandings of ___*(insert math topic/concept)*__?
7. In what way(s) is student understanding evidenced?

Objectives
Success in this course is measured by the degree to which you are able to:

- demonstrate an understanding of the ways in which students develop strong, usable understandings of secondary mathematics content
- analyze instruction and instructional materials for their potential to promote student learning of secondary mathematics content in diverse settings
- design tasks that foster the development of deep understanding of secondary mathematics concepts
- justify instructional decisions by reference to research findings, national standards, and learning theory
- demonstrate the dispositions appropriate to work as a secondary mathematics teacher
- continue to develop your own knowledge of mathematics and problem solving ability as you explore mathematics from the perspective of a teacher and student

Plan for the Course
We will address the guiding questions and objectives as we progress through the course, which is organized into four sections:

I. The Nature of Mathematics and Current Thinking in Mathematics Teaching and Learning
In this part of the course we will explore the nature of doing and understanding mathematics. You will become familiar with the reform movement in mathematics education and the factors that catalyzed that movement. You will also become familiar with the resulting recommendations for teaching and learning offered by the National Council for Teachers of Mathematics (NCTM).

II. The Learning/Classroom Environment
In this part of the course, you will become familiar with various characteristics of effective mathematics teaching. You will explore ways of using questioning, group activity, and well-designed mathematics tasks to promote the development of strong understandings of secondary mathematics concepts. And, you will examine curricular resources and standards documents in consideration of they made be used to design instruction.

III. Planning Instruction
In this part of the course you will apply the knowledge gained in the previous two sections of the course to instructional design. Throughout this section, you will learn how mathematics content can be organized into a unit of study and/or an individual lesson.

IV. The Responsibility of the Teacher in Today's Schools
In this final section of the course you will consider the role of a *mathematics* teacher in today's world. You will consider your responsibility to the diverse group of students you will be teaching and to the surrounding community.

Textbooks and Materials
Daily access to the following materials is required:

Brahier, D.J. (2009). *Teaching secondary and middle school mathematics* (3rd edition). Boston: Pearson Education Inc.

National Council of Teachers of Mathematics (2000). *Principles and standards for school mathematics*. Reston, VA: Author.
Excerpts can be found on-line at http://standards.nctm.org/

Virginia Standards of Learning available at
http://www.pen.k12.va.us/VDOE/Superintendent/Sols/home.shtml

Course Expectations/Assignments
The following assignments will help you (and me) to gauge your development throughout the course:

Assessment	Percentage of Grade: *Undergraduate* Level
Participation and Preparation	15%
Philosophy Statement (Initial and Final)	15%
Problem Lead	15%
Textbook Analysis	20%
Field Work Assignments	10%
Unit Plan and Related Assignments	25%

Participation and Preparation
The participation of each class member is vitally important. If you do not come prepared to discuss the readings, to share you work on a given assignment, and to participate in the activities of the day the entire class will suffer. You **must** commit to be coming to every class on time, being prepared for the evening's activities, and being ready to participate. You can expect that, in addition to work on the larger projects outlined below, there will be weekly readings and assignments that will fall into this category. If, however, there is an emergency and you cannot make it to class, you **must email me ahead of time** and submit all assignments electronically before the end of class.

Philosophy Statement
The instruction a student receives is very much influenced by a teacher's experience and individual philosophy of mathematics teaching and learning. This assignment is meant to help you better understand your philosophy of mathematics teaching and learning at two points: the beginning of the course and the end of the course. A written statement of your philosophy will be valuable to you as you interview for teaching positions.

Problem Lead
This assignment will give you a chance to test your skills in leading work and discussion on a mathematics problem. Given a mathematics problem and a learning goal, you will prepare a "lesson" based around that problem. After the "lesson" you will reflect upon the effectiveness of the approach you used to engage your peers in work with mathematical content.

Textbook Analysis
After you've spent some time thinking about characteristics of instruction that are effective for promoting the development of strong understandings of mathematics, you will have the opportunity to use what you have learned to critique textbook resources for use in designing that instruction. This assignment will introduce you to various textbook resources and allow you to determine how those resources may be useful to you as you prepare to plan your own instruction for the unit plan and in your future work as a teacher.

Field Work Assignments
One of the most valuable pieces of pre-service teacher training is the opportunity to do field work. You will complete 15 hours of field work and keep a log of these hours for submission at the end of the semester. Throughout the semester, you will be required to complete observation assignments during your field work. These assignments provide you with opportunities to reflect upon the practice of teaching after having watched instances of teaching in real world settings.

Unit Plan and Presentation
Throughout the semester, you will explore many issues related to the teaching and learning of mathematics. In this culminating assignment, you will have the opportunity to use the knowledge, skills, and understandings you've gained in the creation of a complete unit of study. Within this unit plan, you will be asked to design lessons that pay attention to the use of technology, the development of student understanding of mathematics content, various standards documents, assessment of student understanding, and ways to differentiate instruction

for diverse groups of learners. After submission of the unit plan, you will present your plan to your peers so that the entire class can begin to create a collection of teaching ideas for various content areas within secondary mathematics.

Communication
You must have a GMU email address (and you must check it often as I will **only** communicate via this medium), you must be able to access Bb (https://courses.gmu.edu/), and you must be able to use the library's collection of e-journals. The best way to contact me is through email, rather than phone.

Evaluation
Final course grades will be assigned based upon weighted percentages as indicated by the Course Expectations.

A	93– 100	B+	87 – 89	C+	77 – 79	D+	67 – 69	F	59 and lower
A-	90 – 92	B	83 – 86	C	73 – 76	D	63 – 66		
		B-	80 – 82	C-	70 – 72	D-	60 – 62		

Student Expectations (as described by the College of Education and Human Development)
- Students must adhere to the guidelines of the George Mason University Honor Code [See http://academicintegrity.gmu.edu/honorcode/].
- Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester [See http://ods.gmu.edu/].
- Students must follow the university policy for Responsible Use of Computing [See http://universitypolicy.gmu.edu/1301gen.html].
- Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account.
- Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.
- Students are expected to exhibit professional behaviors and dispositions at all times.

Campus Resources
- The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance [See http://caps.gmu.edu/].
- The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing [See http://writingcenter.gmu.edu/].
- For additional information on the College of Education and Human Development, Graduate School of Education, please visit our website [See http://gse.gmu.edu/].

Tentative Schedule

The dates are subject to change dependent on the progress of the course. Due dates for major assignments will not be moved to an earlier date, only a later date if necessary.

Date	Topic	Chapter(s) from Brahier Covered	Major Assignment Due
Jan. 25	The Nature of Mathematics and the Reform Movement in Mathematics Education	Chapters 1 and 2	
Feb. 1	Proficiency, Learning Theory, and Implications for Instruction	Chapter 3	Initial Philosophy Statement
Feb. 8	Proficiency, Learning Theory, and Implications for Instruction (con.)	Chapters 3 and Chapter 7 (pp. 167-186)	
Feb. 15	Establishing a Course of Study and Curricular Design	Chapters 4 and 5	
Feb. 22	Establishing a Learning Environment Conducive to Student Engagement	Chapter 7 (pp. 186-203)	
Mar. 1	Planning for Instruction (Unit Planning)	Chapter 6 (pp. 135-142)	
Mar. 8	Planning for Instruction (Lesson Planning)	Chapter 6 (pp. 142-166)	
Mar. 15	*No Class: Spring Break*		
Mar. 22	Planning for Instruction (Lesson Planning)		Text Analysis At least 7 hours of Field Work completed with accompanying assignments
Mar. 29	Meeting the Needs of All Students	Chapter 11	
Apr. 5	Using Technology in the Mathematics Classroom		
Apr. 12	*No Class: NCTM*		
Apr. 19	Assessment of Student Learning	Chapters 9 and 10	At least 4 additional hours of Field Work completed with accompanying assignments
Apr. 26	Catch Up; Work Day		
May 3	Teacher of Mathematics in the School Community	Chapter 12	Unit Plan Fieldwork Hours Sheet(s)
May 6	*No Class: This is a Friday*		Collection of Activities (Graduate Students, only)
May 17	Unit Plan Presentations (*Final Exam Day 7:30 – 10:15 p.m.*)		Final Philosophy Statement