

EDCI 672: Advanced Methods of Teaching Mathematics in Secondary School
George Mason University
Spring 2010

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Class Meets: Wednesday, 7:20 – 10:00, Room 100 Commerce II

Prerequisites: EDCI 572, EDUC 422

Course Objectives:

1. Learn about mathematics teaching and learning in middle and high school via research articles, readings, assignments, in-class presentations, and other resources.
2. Develop understanding of mathematics assessment in the classroom using multiple methods.
3. Develop mathematics activities using technological tools including graphing calculators, software, and other media.
4. Complete a 15-hour field experience

Virginia Department of Education Endorsement Competencies

1. Understanding of connections among mathematical concepts and procedures and their practical applications
2. Understanding of the history of mathematics, including the contributions of different individuals and cultures toward the development of mathematics and the role of mathematics in culture and society
3. Understanding of the role of technology and the ability to use graphing utilities and computers in the teaching and learning of mathematics
4. Understanding of and the ability to select, adapt, evaluate, and use instructional materials and resources, including professional journals and technology
5. Understanding of and the ability to use strategies for managing, assessing, and monitoring student learning, including diagnosing student errors
6. Understanding of and the ability to use strategies to teach mathematics to diverse learners
7. Understanding of and proficiency in grammar, usage, and mechanics and their integration in writing

Required Textbooks and Materials:

Bellman, A. E. (2004). *Explorations: Exploring Mathematics with the Transformation Graphing Application*. Dallas, TX: Texas Instruments.

Dodge, J. (2005). *Differentiation in Action*. New York, NY: Scholastic.

NCTM. (2000). *Mathematics Assessment: A Practical Handbook*. Reston, VA: NCTM. (choose grades 6-8 or 9-12)

Graphing Calculator (e.g. TI 84-Plus) – note this requirement is included since the Praxis II exam requires a graphing calculator.

Other readings as assigned in class

COURSE REQUIREMENTS, PERFORMANCE-BASED ASSESSMENT, AND EVALUATION CRITERIA

Requirements and Expectations

Successful completion of this course requires the following:

1. *A commitment to participation in class discussions and activities.*

The quality of this course depends heavily and primarily on the regular attendance and participation of all involved. Participation will include taking part in discussions informed by critical reading and thinking, leading discussions about selected mathematics strategies, and sharing with the class the products of various writing, reflection, lesson planning, and field experience assignments. The expectations, demands and workload of this course are professional and high.

2. *A commitment to reading reflectively and critically the assigned readings.*

The readings will be used to provide a framework and coherent theme to the course content.

3. *A commitment to attending and taking active part in 15 hours of classroom fieldwork.*

Experience of and participation in a real classroom is essential to bridging the gap between educational theory and practice. Your field experience will provide a basis for classroom discussion. In addition, you will complete a final report about the topic investigated and the results of your data analysis.

Performance-Based Assessments

1. In-Class Activity Participation

Participation in class is expected. You will engage in discussions, give feedback, and participate in activities that require your mathematical background. Points will be awarded based on your participation level and attendance. If you are absent from class, you are expected to make up in-class activities.

2. Instructional Design with Technology

For this assignment, you will evaluate the design of teacher resource materials aimed to help students learn concepts using the graphing calculator. The evaluation will include an analysis of strategies used to design technology-enhanced mathematical investigations for different ability levels, as well as the development of extension questions aimed to remediate or extend learning.

3. Lesson Plan

For this assignment, you will prepare a well-developed lesson plan that spans a two to three day period. The mathematical topic addressed in this lesson should involve a topic assigned by the instructor and the stated objectives, referenced standards, procedures, and assessment must be consistent and appropriate for this topic. The lesson must include differentiated instruction for students of varying levels and the appropriate integration of technology.

4. Mathematics Teaching Strategies

For this assignment, you will have to present one teaching strategy in class and assemble a collection of teaching strategies. This collection of teaching strategies will provide the beginning of collecting methods and strategies for teaching mathematics. The collection will include different strategies, possibilities for modification, and an analysis of their advantages and disadvantages.

5. Micro-teaching Presentation

Students will fully develop a mathematics lesson and teach it to the class. The lesson topic will be assigned by the instructor. The student will be responsible for developing all the materials for the lesson, instruction, and writing a reflection following the micro-teaching.

6. Field Work Project

The field work project will require students to select an aspect of teaching to investigate through the field work placement. Students will develop a topic to investigate, select evidence or assessments, and develop a narrative analysis of the field work question. The project will include statistical analysis of quantitative data.

7. Assessment Tools and Grading Rubric (Graduate Class Only)

Students will develop two assessment instruments and corresponding grading rubrics. One assessment will be a quiz assessing the goals and objectives from the lesson plan submitted in this course with corresponding point values for each of the problems. Another assessment will be a project to reflect the goals and objectives of the lesson plan submitted in this course with corresponding grading rubric.

Criteria for Evaluation

The performance-based assessments listed above will be evaluated and weighted in your final grade according to the following point scale:

	Undergrad	Graduate
In-Class Activity Participation	80 points	80 points
Instructional Design with Technology	50 points	50 points
Lesson Plan	100 points	100 points
Mathematics Teaching Strategy Assignment	50 points	50 points
Micro-teaching Presentation	50 points	50 points
Field Work Project	100 points	100 points
Assessment Tools and Grading Rubrics	n/a	50 points
TOTAL	430 points	480 points

NOTE: All assessments and assignments are subject to change at the discretion of the instructor. Any revisions will be announced in class and posted on the Blackboard site.

Policy on Incompletes:

If circumstances warrant, a written request for an incomplete must be provided to the instructor for approval prior to the course final examination date. Requests are accepted at the instructor's discretion, provided your reasons are justified and that a *major* percentage of your work has already been completed. Your written request should be regarded as a contract between you and the instructor and must specify the date for completion of work. This date must be at least two weeks prior to the university deadline for changing incompletes to letter grades.

COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT STATEMENT OF EXPECTATIONS

The Graduate School of Education (GSE) expects that all students abide by the following:

Students are expected to exhibit professional behavior and dispositions. See gse.gmu.edu for a listing of these dispositions.

Students must follow the guidelines of the University Honor Code. See http://www.gmu.edu/catalog/apolicies/#TOC_H12 for the full honor code.

Students must agree to abide by the university policy for Responsible Use of Computing. See <http://mail.gmu.edu> and click on Responsible Use of Computing at the bottom of the screen.

Students with disabilities who seek accommodations in a course must be registered with the GMU Disability Resource Center (DRC) and inform the instructor, in writing, at the beginning of the semester. See www.gmu.edu/student/drc or call 703-993-2474 to access the DRC.

COURSE SCHEDULE

Class	Date	Topic	Readings Due*	Other Assignments
1	1/20	Introduction to course and requirements; pre-assessment		
2	1/27	Technology Integration	Explorations: Activities 1, 3, 5, and 7	
3	2/3	Technology Integration	Differentiation in Action: Ch. 1-3	Choose teaching topic
4	2/10	Lesson Design		Instructional Design with Technology
5	2/17	Differentiation	Differentiation in Action: Ch. 4-7	Choose teaching topic
6	2/24	Mathematics Teaching Strategies presentations	NCTM Assessment: Ch. 1-2	Prepare for presentation
7	3/3	Mathematics Teaching Strategies presentations	NCTM Assessment: Ch. 1-2	Prepare for presentation
8	3/10		SPRING BREAK	
9	3/17	Assessment	NCTM Assessment: Ch. 3-5	
10	3/24	Assessment		Assessment Tools and Grading Rubric
11	3/31	Micro-Teaching Presentations	TBA*	Prepare for presentation
12	4/7	Micro-Teaching Presentations		Lesson Plan; Prepare for presentation
13	4/14	Micro-Teaching Presentations	TBA*	Prepare for presentation
14	4/21	Micro-Teaching Presentations	TBA*	prepare for presentation
15	4/28	Micro-Teaching Presentations	TBA*	Field Work Project; Prepare for presentation
16	Final exam week	Field Work Project Presentations	TBA*	Prepare for presentation

***Additional readings to be assigned by instructor in class**