

**George Mason University**  
**EDCI 666-001: RESEARCH IN MATHEMATICS TEACHING** 3 credits

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Office hours	Ongoing Illuminate Session, <b>hours TBD based on student survey</b>

### **I. Course Description**

This course explores current issues and research literature in elementary school mathematics. It emphasizes the development of different styles of teaching and several methods of conducting research about mathematics education.

*Prerequisite:* Admission to the Mathematics Education Leadership Master's Degree Program

### **II. Course Learning Outcomes**

At the conclusion of this course, students should be able to:

- A. Study the teaching of mathematics through reading, interpreting, critiquing and synthesizing research.
- B. Develop an annotated bibliography that shows an in-depth knowledge of research in mathematics education.
- C. Utilize observational methods to study mathematics teaching and share the findings with participants and colleagues.
- D. Design and deliver a high-quality professional development presentation and evaluate professional development programs.

### **III. Relationship of Course Learning Outcomes to National Professional Association Standards**

EDCI 666 is designed to enable mathematics education leaders to read, interpret, and evaluate issues in mathematics education research that impact mathematics teaching and learning. It is also designed to promote leadership in professional development and through effective collaboration with colleagues. The course follows the *Standards for Elementary Mathematics Specialists* outlined by the National Council of Teachers of Mathematics and the National Council for Accreditation of Teacher Education (2012).

**3b)** Analyze and consider research in planning for and leading students and teachers in rich mathematical learning experiences.

**4a)** Exhibit knowledge of adult learning, development, and behavior.

**6b)** *Engage in and facilitate continuous and collaborative learning that draws upon research in mathematics education to inform practice; enhance learning opportunities for all students' and teachers' mathematical knowledge development; involve colleagues and other school professionals, families, and various stakeholders; and advance the development in themselves and others as reflective practitioners.*

**6c)** Plan, develop, implement, and evaluate mathematics-focused professional development programs at the school and/or district level; use and assist teachers in using resources from professional mathematics education organizations such as teacher/leader discussion groups, teacher networks, and print, digital, and virtual resources/collections;

and support teachers in systematically reflecting on and learning from their mathematical practice.

6d) *Demonstrate mathematics-focused instructional leadership through actions such as coaching/mentoring; building and navigating relationships with teachers, administrators, and the community; establishing and maintaining learning communities; analyzing and evaluating educational structures and policies that affect students' equitable access to high quality mathematics instruction; leading efforts to assure that all students have opportunities to learn important mathematics; evaluating the alignment of mathematics curriculum standards, textbooks, and required assessments and making recommendations for addressing learning and achievement gaps; developing appropriate classroom or school-level learning environments; and collaborating with school-based professionals to develop evidence-based interventions for high and low-achieving students.*

#### **IV. Nature of Course Delivery**

The delivery of this course combines synchronous and asynchronous online learning sessions, independent study/research, student presentation, and writing. An overview of the Blackboard course site and video orientation to the course will be emailed to students prior to the first class session.

- Synchronous class sessions will take place at 4:30PM Eastern Time Tuesday (Section DL-1) or Thursday (Section DL-2) and will utilize Blackboard Collaborate. Links to the weekly sessions will be sent via email and can also be accessed through the Course Content page in the course Blackboard site.
- I will respond to all email inquiries within 36 hours. Until March 3, I will check email between 9AM and 9PM Eastern Time, and after March 3 from 5AM to 3PM Eastern Time Monday through Saturday.
- Virtual office hours will also be held through Blackboard Collaborate. Hours will be determined after input from a student survey.
- For questions about technology or Blackboard, please contact the Office of Technology Support. The GMU Blackboard Collaborate support site is at <http://coursessupport.gmu.edu/coursetools.cfm?categoryname=Bb%20Collaborate>. Additionally, several ways to contact the office are listed at the bottom of the OTS website: <http://cehd.gmu.edu/ots/portal/>
- Blackboard also has extensive instructions for students at <http://ondemand.blackboard.com/students.htm>
- Back-up plan: If you are unable to connect to a Collaborate session through the computer, you can call in through a number that is given when you access a session on the computer. Before you enter the session "room," you will see a screen with "Room Details" that provides a participant phone number and pin. If you are unable to connect to the internet at all, please contact a friend in the class who can let me know that you will join us as soon as your connection is working. If I am unable to connect to the internet or to Collaborate, I will contact one student in the class via phone with instructions for the session.

#### **V. Required Texts**

Loucks-Horsley, S. (2010). *Designing professional development for teachers of science and mathematics*. (3<sup>rd</sup> ed.). Thousand Oaks, CA: Corwin.

Schwan Smith Margaret, (2001). *Practice-Based Professional Development for Teachers of Mathematics*. Reston, VA: National Council of Teachers of Mathematics.

Choose one from NCTM's *Teachers Engaged in Research* series:

Smith, S. & Smith, M. (Eds.). (2006). *Inquiry into mathematics classrooms, prekindergarten-grade 2*. Greenwich, CT: Information Age Publishing.

Langrall, C. (Ed.). (2006) *Inquiry into mathematics classrooms, grades 3-5*. Greenwich, CT: Information Age Publishing.

Masingila, J. (Ed.). (2006). *Inquiry into mathematics classrooms, grades 6-8*. Greenwich, CT: Information Age Publishing.

Additional readings to be provided electronically.

## **VI. Course Requirements and Assignments**

As current and future leaders in mathematics education, you are and will be responsible for synthesizing information from complex sources and presenting coherent reports for a variety of stakeholders. For this course, you are expected to write **concise but high quality** papers, similar to those you will likely write in the future. Your work will be evaluated on the **clarity** of the theme and key ideas put forth in the paper, the **coherence and organization** of the work, and the **adherence to stated page limits**. Strict page limits are a reality in publishing and report-writing, and it is important to present your ideas with brevity. All papers should follow APA Sixth Edition formatting guidelines. Rubrics for each assignment will be available on Blackboard.

All assignments are due by midnight eastern time on Monday of the week they are due.

Assignments can be revised and resubmitted to recoup a maximum of 75% of the original deduction if your first score is **85% or lower**. (Example: If you earn 80% on your first attempt, you can make *significant* revisions to earn a possible maximum of 95% for the assignment.)

**Revisions must be resubmitted within two weeks of when you receive the original score.** If you choose to resubmit an assignment, please keep in mind the time and energy needed to both revise and reassess the work.

**A. Annotated bibliography and presentation (30% of final grade).** Write an annotated bibliography that includes at least five articles related to a specific topic about researching mathematics teaching. In a group of up to four people, present research to the class that could also be shared with parents, teachers, or administrators about the topic of study. Post the report to Blackboard so that others can use it as a resource. The bibliography is due on the day you give your presentation. **Maximum length of bibliography: 10 double-spaced pages**

**B. Evaluation of Professional Development Sessions or Program (15% of final grade).** Working in a small group, analyze one of the professional development programs or sessions described by another group. Use course materials or other readings to justify your evaluation. **Maximum length: 8 double-spaced pages**

**C. Problem-based Assessment: Planning and leading research-based professional development (35% of final grade):** In conjunction with a school administrator or group of

teachers, identify an area for professional development. Using research from the fields of mathematics education and professional development, develop and deliver a professional development session or sessions. Meet with stakeholders to discuss the impact of the professional development and to reflect on your role as a teacher leader. **Maximum length: 15 double-spaced pages.**

**This assignment must be submitted to TaskStream.** Every student registered for a course with a required performance-based assessment is required to submit the PBA to TaskStream. Evaluation of the performance-based assessment by the course instructor will also be completed in TaskStream. Failure to submit the assessment to TaskStream will result in the course instructor reporting the course grade as Incomplete (IN). Unless the IN grade is changed upon completion of the required TaskStream submission, the IN will convert to an F nine weeks into the following semester.

**D. Participation in online classes, discussions, and activities:** *(20% of final grade)*

The quality of this course depends heavily and primarily on the participation of all involved. Participation will include taking part in synchronous and asynchronous discussions informed by critical reading and thinking, leading discussions about selected mathematics research, and sharing with the class the products of various writing, reflection, and field experience assignments. The expectations, demands and workload of this course are professional and high. Rubrics will be provided for self- and instructor-assessment of 1) participation during synchronous sessions 2) participation during discussion forums and other asynchronous activities.

**VII. Evaluation Criteria**

Determination of the Final Grade: Graduate Grading Scale

A	93%-100%	A-	90%-92%
B+	87%-89%	B	80%-86%
C	70%-79%	F	Below 70%

**VIII. George Mason University Policies and Resources for Students**

- A. Students must adhere to the guidelines of the George Mason University Honor Code [See <http://oai.gmu.edu/the-mason-honor-code/>].
- B. Students must follow the university policy for Responsible Use of Computing [See <http://universitypolicy.gmu.edu/policies/responsible-use-of-computing/>].
- C. 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.
- D. 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/>].
- E. 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/>].
- F. 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>]

- G. Core Values Commitment: The College of Education & Human Development is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles.  
<http://cehd.gmu.edu/values/>

## IX. Course Schedule Synopsis

The course will meet synchronously Tuesday (Section DL-1) or Thursday (Section DL-2) unless otherwise noted.

- Week 1. Introduction to the course and to paradigms for research on teaching mathematics
- Week 2. Reading Educational Research: Literature review and research questions
- Week 3. Reading Educational Research: Methods and data
- Week 4. Reading Educational Research: Analysis, conclusions, next steps, and citations
- Week 5. Reading Educational Research: The Big Picture  
**Student presentations begin this week and continue through week 11.**
- Week 6. Research-based Professional Development: Adult Learning Theories
- Week 7. Research-based Professional Development: Research-Based Practices in Professional Development
- GMU SPRING BREAK Description of professional development program due Monday of this week.**
- Week 8: Research-based Professional Development: Analyze Program(s) and Approaches  
**Asynchronous activities only.**
- Week 9. Research-based Professional Development: What Works Locally  
**Group analysis of professional development programs due Monday of this week.**
- Week 10. Working with Teachers to Improve Mathematics Teaching: Data Collection
- Week 11. Working with Teachers...: Reflective Practice
- SCHOOL DISTRICTS' SPRING BREAK**
- Week 12. Working with Teachers...: Theory into Practice  
**Draft of problem-based assessment due Monday of this week**
- Week 13. Working with Teachers...: Theory into Practice
- Week 14. Presentation of Research Reports; One-page summary of professional development sessions for classroom anthology  
**Problem-based assessment due Monday of the following week to TaskStream.**

Please see the following detailed course schedule for weekly topics, assignments, and due dates.

Approved March 2004. Revised November 2013.

<b>Week of</b>	<b>Topic/Learning Experiences</b>	<b>Readings and assignments due in class</b> <i>Other readings may occasionally be added.</i>
Jan. 20	<i>Topic 1: Reading and analyzing research</i>  Introduction to the course and paradigms for educational research	<a href="#">NCTM Professional Development Research Brief (2009)</a>
Jan. 27	Literature review, research questions, methods and data collection: Data-driven design	Datnow, A., Park, V., & Kennedy-Lewis, B. (2013) Huffman, D, & Kalnin, J. (2003) <a href="#">U. S. Department of Education (2011)</a> (Executive Summary only pp. vii-xii)
Feb. 3	Analysis, conclusions, next steps: Student engagement and motivation	Schweinle, A., Meyer, D. & Turner, J. (2006) Walter, J. & Hart, J. (2009)  Session with distance librarian
Feb. 10	Literature Reviews: Diversity	NCTM Research Committee (2005) <a href="#">NCTM Student Learning Research Brief (2009)</a> <a href="#">US Department of Education (2007)</a>
Feb. 17	Linking Research to Practice: Discourse	Cobb, Boufi, McClain, & Whitenack (1997) Knuth & Peressini (2001) Manouchehri & St. John (2006) Williams & Baxter (1997) <b>Optional:</b> Ryve (2011)  Student presentation
Feb. 24	<i>Topic 2: Research-based professional development</i> Adult learning theories	Knowles, M. (1972) Holyoke, L. & Larson, E. (2009) Trotter, Y. (2006)  Student presentation
Mar. 3 Asynchronous activities only	Research-Based Practices in Professional Development	Loucks-Horsley et al. (2011), Chapter 2 and Chapter 5--begin Student presentation <b>Description of professional development program due March 10.</b>
Mar. 10	<b><i>Mason Spring Break—no class</i></b>	
Mar. 17	Analyze professional development program(s) and approaches	Loucks-Horsley et al. (2011) Chapter 5--finish Schwan Smith (2001) Chapters 1-3 Student presentation
Mar. 24	PD: What works locally	Schwan Smith (2001) Chapters 4-5

		Student presentation <b>Group analysis of PD due March 31.</b>
Mar. 31	<i>Topic 3: Working with teachers to improve mathematics teaching</i> Data collection	Student presentation Self-selected chapters from <i>Teachers Engaged in Research</i> series <b>Additional reading TBA</b>
Apr. 7	Reflective practice	Student presentation Ball (1993) Lampert (2001), Chapter 2 Ghaye (2011), Chapter 2
Apr. 14 Asynchronous activities only	<b>School districts' spring break</b>	<b>Draft of problem-based assessment due April 20.</b>
Apr. 21	Linking research to practice	<i>Putting Research into Practice in the Elementary Grades: Readings from Journals of the NCTM</i> , Section 5  <a href="#"><u>Linking Research &amp; Practice: The NCTM Research Agenda Conference Report</u></a> , Chapter 3  Self-selected chapters from <i>Teachers Engaged in Research</i> series
Apr. 28	Linking research to practice	Self-selected chapters from <i>Teachers Engaged in Research</i> series
May 5	<b>Research symposium</b>	<b>Problem-based assessment due to Task Stream May 12.</b>
May 12	<b>Upload PBA to TaskStream</b>	