George Mason University
College of Education and Human Development
Mathematics Education Leadership

EDCI 855.001 – Mathematics Education Research on Teaching and Learning
3 Credits, Spring 2018
Tuesdays/4:30-7:10 pm Thompson Hall L028

Faculty

Name:	Dr. Courtney Baker
Office Hours:	By Appointment
Office Location:	Thompson Hall 2405
Office Phone:	703-993-5041; cell phone 703-615-1314
Email Address:	cbaker@gmu.edu

Prerequisites/Corequisites

Admission into the Mathematics Education Leadership program.

University Catalog Course Description

Students survey most current research literature in mathematics education and engage in research, study and discussion on teaching and learning in school settings.

Course Overview

Not Applicable.

Course Delivery Method

This course will be delivered using a lecture format.

Learner Outcomes or Objectives

This course is designed to enable students to do the following:

1. Analyze and reflect on mathematics education research about student learning.
2. Understand major theoretical positions in mathematics education.
3. Explain the development of theories of mathematics education.
4. Begin to conduct mathematics education research.

Professional Standards (Association of Mathematics Teacher Educators (AMTE))

Upon completion of this course, students will have met the following professional standards:

EDCI 855 is designed to enable mathematics education leaders to understand learning and teaching in mathematics as introduction to foundational theories and research in the field. The course was developed according to the joint position statement of the Association of Mathematics Teacher Educators and the National Council of Teachers of Mathematics, *Principles to Guide the Design and Implementation of Doctoral Programs in Mathematics Education.* This position statement indicates that the core knowledge expectations for doctoral study in mathematics education include the following under "learning": "Fundamental theories of learning mathematics provide the foundation for thinking about issues in mathematics education. Mathematics educators need to understand these theories and the distinctions among them in terms of both the kind of learning they are trying to explain and the theoretical constructs that have proven useful over time. A treatment of both historic and contemporary theories of learning should be a part of all doctoral programs in mathematics education. Drawing on current theories and research, doctoral students should understand how people of different ages, mathematical backgrounds, and aptitudes learn mathematics. This understanding may be accomplished by various means including courses, seminars, or special readings focusing on theories of learning and the accompanying research evidence. In addition, a doctoral program should provide opportunities for candidates to link their knowledge to practice in designing or evaluating curricula, setting learning goals, and creating cognitively appropriate patterns of instruction" (p. 5-6, AMTE, 2002).

Required Texts

Carpenter, T. P., Dossey, J. A., & Koehler, J. L. (2004). *Classics in mathematics education research*. Reston, VA: National Council of Teachers of Mathematics.

Lester, F. (2008). *Second handbook of research on mathematics teaching and learning.* Charlotte, NC: Information Age Publishing.

National Council of Teachers Mathematics. (2014). *Principles to actions: Ensuring mathematical success for all.* Reston, VA: National Council of Teachers of Mathematics.

Course Performance Evaluation

Students are expected to submit all assignments on time in the manner outlined by the instructor (e.g., Blackboard, Tk20, hard copy).

All assessments have more detailed descriptions available on the Blackboard site for the course.

Students will need to review these detailed descriptions prior to submission. Final papers should be submitted in Blackboard.

- **Assignments**

  CURRICULUM VITAE: Submit a copy of your CV. For samples, you can visit CEHD faculty web pages to find their CVs. http://gecd.mit.edu/jobs/find/prepare/cv is a guide to CV writing and provides additional links.

  MATHEMATICS KNOWLEDGE AND UNDERSTANDING REVIEW: Submit a 20-page paper reviewing the research literature related to a particular mathematics topic. The review should include references from peer-reviewed journals and books describing the development of students' understanding and how various researchers have examined the topic.

  POSITION PAPER: Compare and contrast two positions in mathematics education (e.g., Behaviorism vs. Constructivism, problem-based learning vs. drill and practice, using calculators vs. paper-based activities) examining the fundamental tenets and propositions of each position. Describe the strengths and weaknesses of each position. Your arguments should be supported by literature from the field.

  CLINICAL INTERVIEW: Find 3 students or adults and create a problem set to provide them during a clinical interview session about their understanding of a particular mathematical topic. Write a 5-10 page analysis of the interview results. What were their struggles? What concepts do they understand? Part of your work as a mathematics educator and researcher involves conducting interviews and understanding how people think about mathematics. This assignment is intended to help you develop both of these skill sets.

  PARTICIPATION: Students are expected to actively engage in all course activities throughout the semester, which includes viewing all course materials, completing course activities and assignments, and participating in course discussions and group interactions. A commitment to participation in class discussions and 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 problems, and sharing with the class the products of various writing, reflection, lesson planning, and assignments. The expectations, demands and workload of this course are professional and high.

- **Other Requirements**
  - **Formatting Assignments:** All papers should follow the guidelines in the *Publication Manual of the American Psychological Association (6th Ed.)* for formatting reference lists, citations, the body of the paper, etc. As most classes and your dissertation will require APA 6th formatting, I strongly recommend purchasing the APA 6th Handbook.

- **Late Assignments:** All assignments are due on the date listed in the schedule. 10% of points earned will be deducted for late work if students have not notified the instructor in advance of late submission and had the late submission approved.

Assignment	Points
Curriculum Vitae	50
Mathematics Knowledge and Understanding Review	200
Position Paper	200
Clinical Interview	200
Class Participation	150
TOTAL	800

- **Grading Scale**

Grade	Points
A	720+
B	640-719
C	560-639
F	Less than 559

Professional Dispositions

See https://cehd.gmu.edu/students/polices-procedures/

Class Schedule

Note: Faculty reserves the right to alter the schedule as necessary, with notification to students.

CME=*Classics in Mathematics Education Research*
HRMTL ## = *Second handbook of research on mathematics teaching and learning, Chapter XX*
PTA = *Principles to Actions*

Date	Readings Due	Assignments Due
January 23, 2018		
January 30, 2018	Skemp, Erlwanger p. vii-16 (PTA) p. 35-41 (PTA) p. 78-118 (PTA)	
February 6, 2018 *Number*	Verschaffel et al (HRMTL, 13) Lamon (HRMTL, 14) Brownell (CME) p. 42-47 (PTA)	**Curriculum Vitae**
February 13, 2018 *Constructivism*	Steffe & Kieran (CME) Cobb & Yackel (CME) p. 48-52 (PTA)	**Clinical Interview Problem Set**
February 20, 2018 *Learning Trajectories*	Sztajn, Confrey, Wilson & Edgington (2012) Szilágyi, Clements & Sarama (2013) p. 70-77 (PTA)	
February 27, 2018 *Algebra*	Carraher & Schliemann, (HRMTL, 15) Kieran (HRMTL, 16)	Class Presentation #1
March 6, 2018 *Equity*	Fennema & Sherman (CME) Bishop & Forgasz (HRMTL, 26) p. 59-69 (PTA)	**Clinical Interview Paper** Class Presentation #2
March 13, 2018 *Diversity* Asynchronous Class Session	Diversity (HRMTL, 10)	
March 20, 2018 *Problem Solving*	Schoenfeld (CME) Kilpatrick (CME) Lesh & Zawojewski (HRMTL, 17) p. 17-34 (PTA) p. 53-58 (PTA)	Class Presentation #3

March 27, 2018	No Class - Spring Break	
April 3, 2018 *Geometry*	vanHiele (CME) Battista (HRMTL, 19)	Class Presentation #4
April 10, 2018 *Early Childhood*	Clements & Sarama (HRMTL, 12)	Class Presentation #5
April 17, 2018 *Statistics*	Jones & Langrall, HRMTL, 20 Shaughnessy, HRMTL, 21	Math Knowledge Paper Class Presentation #6
April 24, 2018 Asynchronous Class Session	Critical Friend Work	
May 1, 2018 *Proof*	Tall & Vinner (CME) Harel & Sowder (HRMTL, 18)	Class Presentation #7
May 8, 2018 *Post-Secondary & Informal Math*	Artigue et al (HRMTL, 22) Carraher et al (CME) D'Ambrosio (CME)	**Position Paper** Class Presentation #8

Core Values Commitment

The College of Education and 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/.

GMU Policies and Resources for Students

Policies

- Students must adhere to the guidelines of the Mason Honor Code (see https://catalog.gmu.edu/policies/honor-code-system/).
- Students must follow the university policy for Responsible Use of Computing (see http://universitypolicy.gmu.edu/policies/responsible-use-of-computing/).
- Students are responsible for the content of university communications sent to their Mason 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 with disabilities who seek accommodations in a course must be registered with George Mason University Disability Services. Approved accommodations will begin at the

time the written letter from Disability Services is received by the instructor (see http://ods.gmu.edu/).

- Students must follow the university policy stating that all sound emitting devices shall be silenced during class unless otherwise authorized by the instructor.

Campus Resources

- Support for submission of assignments to Tk20 should be directed to tk20help@gmu.edu or https://cehd.gmu.edu/aero/tk20. Questions or concerns regarding use of Blackboard should be directed to http://coursessupport.gmu.edu/.

- For information on student support resources on campus, see https://ctfe.gmu.edu/teaching/student-support-resources-on-campus

For additional information on the College of Education and Human Development, please visit our website https://cehd.gmu.edu/students/ .