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

EDCI 855 DL1 – Mathematics Education Research on Teaching and Learning
3 Credits, Spring 2021
Wednesdays, 4:30-7:10 p.m.; Synchronous Online

Faculty

Name:	Dr. Courtney Baker
Office Hours:	By Appointment
Office Location:	Thompson Hall 2400A
Office Phone:	(703) 993-5041; cell phone (703) 615-1314
Email Address:	cbaker@gmu.edu

COVID 19 Procedures: Spring 2021
Students, please be aware of and follow all policies and procedures for Mason's Safe Return to Campus: https://www2.gmu.edu/Safe-Return-Campus

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 online (76% or more) using a synchronous format via Blackboard Learning Management system (LMS) housed in the MyMason portal. You will log in to the Blackboard (Bb) course site using your Mason email name (everything before @masonlive.gmu.edu) and email password. The course site will be available on Monday, January 25, 2021.

Under no circumstances, may candidates/students participate in online class sessions (either by phone or Internet) while operating motor vehicles. Further, as expected in a face-to-face class meeting, such online participation requires undivided attention to course content and communication.

Technical Requirements

To participate in this course, students will need to satisfy the following technical requirements:

- High-speed Internet access with standard up-to-date browsers. To get a list of Blackboard's supported browsers see: https://help.blackboard.com/Learn/Student/Getting_Started/Browser_Support#supported-browsers

  To get a list of supported operation systems on different devices see: https://help.blackboard.com/Learn/Student/Getting_Started/Browser_Support#tested-devices-and-operating-systems
- Students must maintain consistent and reliable access to their GMU email and Blackboard, as these are the official methods of communication for this course.
- Students will need a headset microphone for use with the Blackboard Collaborate web conferencing tool.
- Students may be asked to create logins and passwords on supplemental websites and/or to download trial software to their computer or tablet as part of course requirements.
- The following software plug-ins for PCs and Macs, respectively, are available for free download:
  - Adobe Acrobat Reader: https://get.adobe.com/reader/
  - Windows Media Player: https://support.microsoft.com/en-us/help/14209/get-windows-media-player
  - Apple Quick Time Player: www.apple.com/quicktime/download/

Expectations

- Course Week: Our course week will begin on the day that our synchronous meetings take place as indicated on the Schedule of Classes.
- Log-in Frequency:
  Students must actively check the course Blackboard site and their GMU email for communications from the instructor, class discussions, and/or access to course materials at least 3 times per week. In addition, students must log-in for all scheduled online synchronous meetings.
- 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.
- Technical Competence:
  Students are expected to demonstrate competence in the use of all course technology. Students who are struggling with technical components of the course are expected to seek assistance from the instructor and/or College or University technical services.
- Technical Issues:

Students should anticipate some technical difficulties during the semester and should, therefore, budget their time accordingly. Late work will not be accepted based on individual technical issues.

- Workload:
  Please be aware that this course is **not** self-paced. Students are expected to meet *specific deadlines* and *due dates* listed in the **Class Schedule** section of this syllabus. It is the student's responsibility to keep track of the weekly course schedule of topics, readings, activities and assignments due.
- Instructor Support:
  Students may schedule a one-on-one meeting to discuss course requirements, content or other course-related issues. Those unable to come to a Mason campus can meet with the instructor via telephone or web conference. Students should email the instructor to schedule a one-on-one session, including their preferred meeting method and suggested dates/times.
- Netiquette:
  The course environment is a collaborative space. Experience shows that even an innocent remark typed in the online environment can be misconstrued. Students must always re-read their responses carefully before posting them, so as others do not consider them as personal offenses. *Be positive in your approach with others and diplomatic in selecting your words*. Remember that you are not competing with classmates, but sharing information and learning from others. All faculty are similarly expected to be respectful in all communications.
- Accommodations:
  Online learners who require effective accommodations to insure accessibility must be registered with George Mason University Disability Services.

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

**Additional readings will be posted on Blackboard.

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

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

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

Recommended Texts

American Psychological Association (2020*). Publication manual of the American psychological association*. APA.

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). Detailed instructions and rubrics for all assignments will be posted to the Blackboard site for the course at http://mymason.gmu.edu. Please refer to these documents when completing your work. All written assignments should be submitted using APA 7th Edition for formatting.

All assignments should be submitted in Blackboard by 11:59 pm on the due date for the assignment. Extensions may be provided at the instructor's discretion only with permission provided by email *prior* to the deadline. Assignments submitted after the deadline will be subject to a 10% reduction in grade for the assignment.

- **Assignments and/or Examinations**

  All assignments are to be completed on time so that class members might benefit from the expertise and contributions of their colleagues. **Additional details and rubrics for all assignments will be posted on Blackboard.**

A. **CLASS PARTICIPATION (10%)**

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.

B. **CURRICULUM VITAE (10%)**
Update and submit a copy of your curriculum vitae (CV). Your CV should be in APA (7th edition) format. For samples, you can visit CEHD faculty web pages to find their CVs. Additionally, http://gecd.mit.edu/jobs/find/prepare/cv is a guide to CV writing and provides additional links.

C. **MATHEMATICS KNOWLEDGE AND UNDERSTANDING REVIEW (30%)**
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.

D. **TEACHING & LEARNING SESSION LEADER ASSIGNMENT (25%)**
Each student will be responsible for leading a session of the course this semester. Session leadership involves three responsibilities: designing and planning a rationale, leading the session and reflecting on the session. Students will receive feedback prior to their session facilitation from a critical friend and the instructor.

E. **CLINICAL INTERVIEW (25%)**
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.

- **Other Requirements**

A. **Attendance** It is your responsibility to attend all class sessions. You are held accountable for all information from each class session whether you are present or not. Reasons for any absence must be reported to the instructor in writing.
B. **Tardiness** It is your responsibility to be on time for each class session. Reasons for any absence must be reported to the instructor in writing.
C. **Formatting Assignments:** All papers should follow the guidelines in the *Publication Manual of the American Psychological Association (7th Ed.)* for formatting reference lists, citations, the body of the paper, etc. As most classes and your dissertation will require APA 7th formatting, I strongly recommend purchasing

the APA 7th Handbook.

D. **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.

- **Grading**

  The final evaluation criteria utilizes the graduate grading scale and is as follows:

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

- **Course Performance Evaluation Weighting**

10%	Participation
10%	Curriculum Vitae
30%	Mathematics Knowledge and Understanding Review
25%	Teaching & Learning Session Leader Assignment
25%	Clinical Interview

Professional Dispositions

Students are expected to exhibit professional behaviors and dispositions at all times. Education professionals are held to high standards, both inside and outside of the classroom. Educators are evaluated on their behaviors and interactions with students, parents, other professionals, and the community at large. At the College of Education and Human Development, dispositions may play a part in the discussions and assignments of any/all courses in a student's program (and thus, as part or all of the grade for those assignments). For additional information visit: https://cehd.gmu.edu/students/polices-procedures/

This course will require students to audiotape, videotape, or use the audio/video conferencing feature. Students should dress professionally, speak professionally, and aware of their recording surroundings and backgrounds. Background noise (such as television, music, conversations, etc.) and inappropriate background video are distracting, unprofessional, and not allowed in this course.

Class Schedule

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

Date	Topic(s)	Readings Due	Assignments Due

Class 1 January 27 **Format** Synchronous	Syllabus Overview Developing Our Community Agreements Connecting Research to Practice Curriculum Vitae Overview	No Assigned Readings Due	Profile picture and information posted in Collaborate.
Class 2 February 3 **Format** Synchronous	Thinking Critically about Teaching and Learning Mathematics	Martin (2015) Briars et al. (2015) Meyer (2016)	**Curriculum Vitae Due**
Class 3 February 10 **Format** Synchronous	Constructivism Research Librarian Visit	Steffe & Kieran (CME) Cobb & Yackel (CME) p. 48-52 (PTA)	
Class 4 February 17 **Format** Synchronous	Issues in Access & Equity	Fennema & Sherman (CME) Bishop & Forgasz (HRMTL, 26) p. 59-69 (PTA)	
Class 5 February 24 **Format** Synchronous	**Learning Trajectories**	Sztajn et al. (2012) Szilágyi et al. (2013) p. 70-77 (PTA)	
Class 6 March 3 **Format** Synchronous	Informal Mathematics	Carraher et al. (CME) D'Ambrosio (CME) King & Pringle (2018)	

Class 7 March 10 **Format** Synchronous	Problem Solving	Schoenfeld (CME) Kilpatrick (CME) Lesh & Zawojewski (HRMTL, 17) p. 17-34 (PTA) p. 53-58 (PTA)	
Class 8 March 17 **Format** Synchronous	Clinical Interviews & Student Understanding	Erlwanger (CME) Skemp (2006) Leonard et al. (2010)	
Class 9 March 24 **Format** Asynchronous	Writer's Workshop		
Class 10 March 31 **Format** Synchronous	Developing Clinical Interviews	Hunting (1997) De Araujo et al. (2018)	**Math Knowledge Paper Due**
Class 11 April 7 **Format** Synchronous	Early Childhood (*Presentation #1)*	Clements & Sarama (HRMTL, 12)	**Clinical Interview Problem Set Due**
Class 12 April 14 **Format** Synchronous	Whole Numbers and Concepts (*Presentation #2)* Rational Numbers & Proportional Reasoning (*Presentation #3)*	Verschaffel et al. (HRMTL, 13) Lamon (HRMTL, 14)	*Conduct Clinical Interviews*

Class 13 April 21 **Format** Synchronous	Early Algebra (*Presentation #4)* Learning & Teaching of Algebra (*Presentation #5)*	Carraher & Schliemann (HRMTL, 15) Kieran (HRMTL, 16)	*Conduct Clinical Interviews*
Class 14 April 28 **Format** Synchronous	Geometric & Spacial Thinking (*Presentation #6)*	Battista (HRMTL, 19)	
Class 15 May 5 **Format** Synchronous	Probability (*Presentation #7)* Statistics (*Presentation #8)*	Jones & Langrall (HRMTL, 20) Shaughnessy (HRMTL, 21)	**Clinical Interview Paper Due**

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

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 https://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 https://ds.gmu.edu/).

- Students must silence all sound emitting devices 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 https://its.gmu.edu/knowledge-base/blackboard-instructional-technology-support-for-students/.

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

Notice of mandatory reporting of sexual assault, interpersonal violence, and stalking:
As a faculty member, I am designated as a "Responsible Employee," and must report all disclosures of sexual assault, interpersonal violence, and stalking to Mason's Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason's confidential resources, such as Student Support and Advocacy Center (SSAC) at 703-380-1434 or Counseling and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance from Mason's Title IX Coordinator by calling 703-993-8730, or emailing titleix@gmu.edu.

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