

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

EDCI 645.6M1 – Curriculum Development in Mathematics Education
3 Credits, Fall 2017
Mondays 7:20 – 10:00 p.m.

Faculty

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Prerequisites/Corequisites

Admission to the Mathematics Education Leadership Master's Degree Program or instructor permission.

University Catalog Course Description

Analysis, design and evaluation of school mathematics curricula. Yearlong seminar for master's-level students in mathematics education leadership program.

Course Overview

EDCI 645 is designed to enable mathematics education leaders to evaluate mathematics curriculum materials appropriate for school mathematics. See also Learner Outcomes and Professional Standards.

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 August 28.

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 a standard up-to-date browser, either Internet Explorer or Mozilla Firefox is required (note: Opera and Safari are not compatible with Blackboard).
- 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. [Delete this sentence if not applicable.]
- 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: [Add or delete options, as desire.]
 - Adobe Acrobat Reader: <https://get.adobe.com/reader/>
 - Windows Media Player:
<https://windows.microsoft.com/en-us/windows/downloads/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. Identify standards-based school mathematics curriculum (K-8); Analyze key characteristics of outstanding curriculum materials for school mathematics
2. Examine learning theories that have been influential in mathematics education and identify ways those theories have been translated into curriculum materials and strategies for teaching.
3. Evaluate commercially developed school mathematics curriculum materials to make informed choices.
4. Present and discuss a set of school mathematics curriculum materials in depth.
5. Design a small curriculum project based on key design principles.

Professional Standards (National Council of Teachers of Mathematics (NCTM))

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

The course follows the NCTM NCATE *Standards for Elementary Mathematics Specialists (2012)*. In your role as a teacher, lead teacher, and/or coach/mentor, elementary mathematics specialist candidates:

3a) Apply knowledge of curriculum standards for elementary mathematics and their relationship to student learning within and across mathematical domains in teaching elementary students and coaching/mentoring elementary classroom teachers.

4b) Plan, create, and coach/mentor teachers in creating developmentally appropriate, sequential, and challenging learning opportunities grounded in mathematics education research in which students are actively engaged in building new knowledge from prior knowledge and experiences.

4c) Incorporate knowledge of individual differences and the cultural and language diversity that exists within classrooms and include and assist teachers in embracing culturally relevant perspectives as a means to motivate and engage students.

4d) Demonstrate and encourage equitable and ethical treatment of and high expectations for all students.

4e) Apply mathematical content and pedagogical knowledge in the selection, use, and promotion of instructional tools such as manipulatives and physical models, drawings, virtual environments, presentation tools, and mathematics-specific technologies (e.g., graphing tools and interactive geometry software); and make and nurture sound decisions about when such tools enhance teaching and learning, recognizing both the insights to be gained and possible limitations of such tools.

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*.

Required Texts

Tomlinson, C. A., Imbeau, M. B. (2010). *Leading and managing a differentiated classroom*. Alexandria, VA: ASCD.

Stein, M. K., Smith, M. S., Henningsen, M. A., & Silver, E. A. (2009). *Implementing standards-based mathematics instruction: A casebook for professional development* (2nd ed.). New York and Reston, VA: Teachers College Press and National Council for Teachers of Mathematics.

Virginia Standards of Learning
Common Core State Standards for Mathematics

Additional readings will be posted on the course Blackboard site. You will need your GMU email login and password to access.

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).

The assignments are intended to develop skills in mathematics curriculum analysis and evaluation, and the ideal and implemented curriculum. Students conduct in-depth study of mathematics curriculum materials, relate materials to goals and objectives of the ideal curriculum, and present an evaluation of their findings. Discussions will be focused on the nature and development of curriculum in schools. All assignments are to be completed on time so that class members might benefit from the expertise and contributions of their colleagues.

1. PARTICIPATION (10%)

- a. 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 field experience assignments. The expectations, demands and workload of this course are professional and high.
- b. A commitment to reading reflectively and critically the assigned readings.^[1]^[SEP]The readings will be used to provide a framework and coherent theme to the course content. They have been selected to introduce themes in curricular development as well as research and critical commentary on mathematics curriculum.

2. PHOTO NARRATIVE PROJECT (10%)

The goal of the project is to take a series of photos (4) that tell the story of mathematics teaching and learning in your school and/or community. Two pictures should illustrate factors that help the teaching and learning of mathematics; two pictures should illustrate factors that hinder the teaching and learning of mathematics. Your assignment should include: your goals and objectives of teaching mathematics, connections between the photos, and the topics covered by the readings thus far. Additional details for this assignment (project description & rubric) are provided in Blackboard/Assignments.

3. MATHEMATICS SPECIALIST RESOURCE COLLECTION (25%)

(NCTM NCATE 3a, 4b, 4c, 4d, 4e)

Begin a collection of resources addressing the following items: Math Teaching Tip, Great Articles and Books, Technology Implementation, Diverse Learners. Be sure to state the goals/objectives of the ideal curriculum you are basing your items on for this assignment. All are to be submitted to our Google Drive so other class members may view the resources. The final collection will also be uploaded to Blackboard/Assignments. Additional details for this assignment (project description & rubric) are provided in Blackboard/Assignments.

4. CURRICULUM ANALYSIS PROJECT (30%)

(NCTM NCATE 6d)

Part of your work as a mathematics specialist will be to understand the materials the teachers in your classrooms are currently using. This assignment will include three

phases: Ideal Curriculum, Implemented Curriculum, and Ideal & Implemented Curriculum. Additional details for this assignment (project description & rubric) are provided in Blackboard/Assignments.

5. CLASS CONSTRUCTED CURRICULUM TASKS (25%)

(NCTM NCATE 3a, 4b, 4c, 4d, 4e, 6d)

A common challenge math specialists face is finding good problems and tasks for teachers to use with their students. As a whole class project, we are going to construct a curriculum (in this case, a collection of tasks) addressing a blend of four content strands (number, algebra, geometry, data analysis) and different mathematical practices (reasoning, problem solving, proof, representations). During our final class meeting, each group will **present** an overview of their collection of tasks, goals/objectives/overview of a task(s), and how it may be modified for usage in vertical alignment.

ASSIGNMENT	PERCENT
Participation	10%
Photo-Narrative Project	10%
Mathematics Specialist Wiki Collection	25%
Curriculum Analysis Project	30%
Class Constructed Curriculum Tasks	25%

GRADING POLICY (Graduate Grading Scale)

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

Professional Dispositions

Students are expected to exhibit professional behaviors and dispositions at all times.

Class Schedule

Date	Topic(s)	Readings	Due
Week 1 8/28 Format Synchronous	Collaborate Ultra Orientation Syllabus Overview Introduction to Curriculum and Standards Class Constructed Tasks: Group Formation		Profile picture and information posted in Collaborate.
9/4 Labor Day	No Class Meeting		
Week 2 9/11 Format Synchronous	Philosophical Foundations of Curriculum Behaviorism vs. Constructivism	Articles Erlwanger (1973) Schoenfeld (2002)	Photo Narrative Project Due
Week 3 9/18 Format Synchronous	Content and Practice Standards Learning Trajectories and Progressions	Standards CCSSM Standards for Mathematical Practice NCTM Process Standards Articles Remora (2009) Charles (2008) Choice of One Clements Video http://www.curriculum.org/k-12/en/videos/doug-clements-learning-trajectories OR Sarama & Clements (2009)	Be Prepared to Discuss Phase 1 of Curriculum Analysis Project and Rubric
Week 4 9/25 Format Synchronous	The State of Textbooks	Articles Baker et al (2010) p. 396-417 Taylor (2013)	MS Resource: Math Teaching Tip OR Technology Implementation
Week 5 10/2 Format Synchronous	High-Level Tasks Maintaining Cognitive Demand	Stein, Smith, Henningsen & Silver, 2009 (Purple Book) Introduction Chapters 1 & 2 Articles Stein & Smith (1998)	First Class Constructed Curriculum Task Posted: Resource
Week 6 10/10	Teacher Philosophy and Vision	Tomlinson & Imbeau Chapters Intro, Chapter 1	MS Resource: Math Teaching Tip OR

<p>Tuesday Meeting (Columbus Day)</p> <p>Format Synchronous</p>		<p>Articles Eisenmann & Even (2009) Brown et. al (2009)</p>	Technology Implementation
<p>Week 7 10/16</p> <p>Format Synchronous</p>	PCK and Teacher Learning	<p>Articles Hill & Ball (2009) Remillard (2000) Grant et. al (2009)</p>	Be prepared to discuss Phase II of Curriculum Analysis Project
<p>Week 8 10/23</p> <p>Format Asynchronous</p>	Equity & Access	<p>Articles Gutstein (2003) Jacobs (2010)</p> <p>Videos Uri Treisman NCTM Equity Address (2013) (52 minutes) https://vimeo.com/65731353</p> <p>Robert Moses NPR Radio Story (2013) (8 minutes) http://www.npr.org/sections/codeswitch/2013/08/02/206813091/to-60s-civil-rights-hero-math-is-kids-formula-for-success</p>	MS Resource: Great Articles & Books
<p>Week 9 10/30</p> <p>Format Synchronous</p>	Curricular Vision and Beliefs	<p>Tomlinson & Imbeau Chapters 2, 3</p> <p>Drake & Sherin (2009)</p>	
<p>Week 10 11/6</p> <p>Format Synchronous</p>	Implementation	<p>Tomlinson & Imbeau Chapters 4, 5</p> <p>Stein, Smith, Henningsen & Silver, 2009 (Purple Book) Chapter 6</p>	Second Class Constructed Curriculum Task Posted: Resource
<p>Week 11 11/13</p> <p>Format Synchronous</p>	<p>Differentiation Sticking Points</p> <p>A Teacher's Purpose</p>	<p>Tomlinson & Imbeau Chapter 6, 7</p> <p>Articles Schoenfeld (2009)</p>	Be prepared to discuss Curriculum Analysis Project
<p>Week 12 11/20</p> <p>Format Synchronous</p>	Coaching, Equity & Access	<p>Stein, Smith, Henningsen & Silver, 2009 (Purple Book) Pick one: Chapter 7 or Chapter 9 Chapter 11</p> <p>Articles Sailors & Shanklin (2010)</p>	<p>MS Resource: Diverse Learners</p> <p>MS Resource - Blackboard Upload</p>
<p>Week 13 11/27</p> <p>Format Synchronous</p>	<p>Issues with Access/Impact on Coaching</p> <p>Textbook Evaluation/ Evaluating Curriculum</p>	<p>Articles Flores (2007) Clements (2007)</p>	Class Constructed Curriculum Task & Reflection - Blackboard Upload

Week 14 12/4 Format DB	Independent Work Session		
Week 15 12/11 Format Synchronous	Class Constructed Curriculum Tasks Group Presentations	Franke et. al (2001)	Curriculum Analysis Project Blackboard Upload

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 <http://oai.gmu.edu/the-mason-honor-code/>).
- 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://coursesupport.gmu.edu/>.
- The Writing Center 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/>).
- The 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 Student Support & Advocacy Center staff helps students develop and maintain healthy lifestyles through confidential one-on-one support as well as through interactive programs and resources. Some of the topics they address are healthy relationships, stress management, nutrition, sexual assault, drug and alcohol use, and sexual health (see <http://ssac.gmu.edu/>). Students in need of these services may contact the office by phone at 703-993-3686. Concerned students, faculty and staff may also make a referral to express concern for the safety or well-being of a Mason student or the community by going to <http://ssac.gmu.edu/make-a-referral/>.

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