

**GEORGE MASON UNIVERSITY
Graduate School of Education**

Course Title: Mathematics Education Curriculum Design and Evaluation (K-8)
Program Code: EDCI 856 001 (3 credits)
Fall 2014

Instructor:	Dr. Jennifer Suh	Office Hours:	By appointment
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Office:	Thompson 2203	Class Meets:	David King Jr. Hall 2054 WED. 4:30-7:10

I. Course Description

Yearlong seminar for Ph.D. students in the Mathematics Education Leadership cohort program. Students engage in research, analysis, design and evaluation of school mathematics curricula.

Prerequisite: Admission to the Mathematics Education Leadership Ph.D. Program

II. Student Outcomes

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

- A. Identify standards-based school mathematics curriculum projects; Analyze key characteristics of outstanding curriculum materials for school mathematics.
- B. 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.
- C. Evaluate research on NSF-funded and commercially developed school mathematics curriculum materials to make informed choices.
- D. Present and discuss a set of school mathematics curriculum materials in depth.
- E. Design a school mathematics curriculum project.

III. Relationship to Program Goals and Professional Organization

EDCI 856 is designed to enable mathematics education leaders to evaluate and develop mathematics curriculum materials appropriate for school mathematics. The course was developed according to the joint position statement of the Association of Mathematics Teacher Educators (AMTE) and the National Council of Teachers of Mathematics (NCTM) on 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:

- Design effective curricula and learning environments to facilitate the development of deep and connected mathematical understanding,
- Curriculum design, analysis and evaluation,

- Studies of different strands of curricula,
- Comparisons of international curricula,
- Knowledge of historical, social, political, and economic factors impacting mathematics education, and
- Studies of mathematical concepts across grade levels.

IV. Nature of Course Delivery

The delivery of this course combines methods of lecture, discussion, independent study/research, student presentation, and writing.

Reading is a critical component of the course, and as an advanced graduate level course, the reading load is substantial. It is expected that students will come to class having read the assigned material thoroughly and thoughtfully and that they be willing to share their understandings of the readings in order to contribute to the learning of all class members. For each class session there will be a reading assignment, as indicated in the schedule. Students are expected to bring to class questions or thoughts that the readings have provoked, which will be used to start the conversation about the topic of the day.

Group research project. The several stages outlined in the description will be considered in assessing students' performance on this project. This assignment will count for 20% of the final grade. Being a group assignment, the final grade will be adjusted according to the level of contribution of each participant. Such contribution will be assessed throughout the duration of the project, via a peer assessment form that will be tailored for the project.

A grade of A will be given to students who besides complying with the assignments and deadlines provide thoughtful, creative, and original contributions to the class, provide evidence of deep understanding of the material, and indications that are able to advance their own lines of inquiry. Lower grades will be given when students comply unevenly with assignments, or show partial interest on understanding the readings or assignments, do not suggest nor propose original interpretations or innovative lines of inquiry. A failing grade will be given when students do not comply with the assignments, deadlines, or fail to participate actively in understanding the material or prevent other members of the class to accomplish the course goals.

IV. Texts and Readings

Remillard, J.A., Herbel-Eisenmann, B.A., and Lloyd, G.M. (2011). *Mathematics Teachers at Work: Connecting Curriculum Materials and Classroom Instruction* (Studies in Mathematical Thinking and Learning Series)

NSF-Sponsored Curriculum (online resource). The K-12 Mathematics Curriculum Center (www.edc.org/mcc/curricula.htm)

Selected articles will be posted on Blackboard (see list at the end of the syllabus).

V. Course Requirements and Assignments

A. Curriculum Design Research Paper: Understanding Learning Trajectories, Progression and Curriculum Development (30%) Individual Project

Part 1: Lit Review (Part 1 due 10/22/14)

Select a curriculum design approach (i.e. problem-solving approach; Project-based Learning; model eliciting activities) in mathematics education (grades k-12) and/or a standard based curriculum. Review how the learning progressions and student learning trajectories are addressed in the curriculum and standards.

Part 2: Pilot research: (Final Paper with Lit Review due 12/3/14)

- a) Design a mini unit based on the chosen curriculum design approach and conduct a pilot research using a teaching experiment or a diagnostic interview approach;
- b) If you chose to research a standard-based curriculum, conduct a classroom observation/ or Interview/Survey teachers using a standard-based curriculum.

B. Curriculum Learning Analysis (20%) Group Project

Curriculum and Students Learning Analysis: Attend a Fall Lesson Study to use the data to analyze how teachers enact a lesson task and how students interpret the task using the framework described in research. Write up an analysis from the project data.

C. Read and Summarize a Dissertation (20%)

Select a dissertation to read from the list provided. Prepare a presentation for the class about the dissertation including the following sections: background information, research questions, methodology, results, and implications for further research.

D. Article Leading (20%)

Select one of the articles assigned for reading during the week. Prepare a summary using the abstract format provided. Lead a discussion of the article in class.

E. Update Vita and Cover Letter (10%)

Update your vita and write a cover letter to accompany your CV. The goal of this assignment is to have you critically exam your goals and objectives in the Ph.D. program and articulate those goals to a prospective employer. It is also designed to help you reflect on areas where you might want to do more work or gain more experience.

Attendance. It is your responsibility to attend all class sessions and to be on time for each class session. You are held accountable for all information from each class session whether you are present or not. Please report your reasons for any absences to the instructor in writing/email.

VI. Evaluation Schema

Determination of the Final Grade:

Graduate Grading Scale

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

VII. College and University Policies

The university has a policy that requests students to turn off pagers and cell phones before class begins.

All assignments and papers must be written using **APA 6th edition** formatting.

GSE Syllabus Statements 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 Office of Disability Services (ODS) and inform the instructor, in writing, at the beginning of the semester. See <http://www2.gmu.edu/dpt/unilife/ods/> or call 703-993-2474 to access the ODS.

Approved March 2004, Revised January 2010

GMU POLICIES AND RESOURCES FOR STUDENTS

- a. Students must adhere to the guidelines of the George Mason University Honor Code [See <http://oai.gmu.edu/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 experiences 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. Students must follow the university policy stating that all sound emitting devices shall be turned off during the class unless otherwise authorized by the instructor.
- g. 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/>]

PROFESSIONAL DISPOSITIONS

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

CORE VALUES COMMITMENT

The College of Education and Human Development is committed to *Social justice, Innovation, Research-based practice, Ethical leadership, and Collaboration*. Students are expected to adhere to these principles. [See <http://cehd.gmu.edu/values>]



GRADUATE SCHOOL OF EDUCATION

For additional information on the College of Education and Human Development, Graduate School of Education, please visit our website [See <http://gse.gmu.edu/>]

In class and online Activity

Textbook analysis: Each student will be assigned a textbook from the list provided and a list of articles that report an analysis of textbooks (included at the end of this syllabus). Your task consists of replicating the analysis found in two of the articles in the list. The experience of doing this analysis will result in a memo including the following:

- The APA reference of the articles chosen and the rationale for the choice.
- A brief summary of the theories upon which the analyses are based.
- A set of possible questions that you could answer using the articles and the textbook assigned and that expand our knowledge beyond what the author(s) found-by virtue of combining the two analyses.
- The findings from the analyses. Analyze only a small portion of your text: between 5% and 10% of the units analyzed by the authors.
- A summary of the difficulties encountered in applying the methodology described in the articles and the decisions you made in order to analyze your text. What do we learn by these combined analyses?
- A brief reflection on the activity: what did you learn through this activity?

VII. Course Schedule

Class meets 4:30 pm - 7:10 pm Wednesdays

David King Jr. Hall 2054

Date	Topic and Reading	Class Activity	Assignment due
8/27/14	Introduction to Curriculum: Task Analysis Stein, M. K., Grover, B. W., & Henningsen, M. (1996). Stein, M. K., & Kaufman, J. H. (2010)	Introduction Share CV/Portfolio Curriculum Research: Task Analysis	
9/3/14	Framework for Curriculum Research Stein, Remillard, & Smith, 2007	Examine National Curriculum <ul style="list-style-type: none"> • CCSSM • Learning Progression • Assessment 	Readings: <i>Updated CV & Cover Letter*</i> Stein, Remillard, & Smith, 2007
9/10/14	NCTM's Principles to Action NCTM Principles to Action	In class Curriculum and Principles alignment	Readings: NCTM Principles to Action
9/17/14	Ideal Curriculum: National Policy Cobb & Jackson, 2011; Porter, McMaken, Hwang, & Yang, 2011a, 2011b	In class text analysis	Readings: Cobb & Jackson, 2011; Porter, McMaken, Hwang, & Yang, 2011a, 2011b
9/24/14	Learning Progressions & Learning Trajectory Simon, M. (1995) Ellis, A. (2014)	Understanding Learning Trajectories	Readings: Simon, M. (1995) Ellis, A. (2014)
10/1/14	Textbook Analysis Activity Clements (2007) MTW Part I		Readings: Clements (2007) MTW Part I
10/8/14	Studying Teachers' Use of Curriculum Materials MTW Part II Ch. 2, 3 (commentary 6 or 7)	Leading an article*	Readings: MTW Part II Ch. 2, 3 (commentary 6 or 7)
10/15/14	Enacted Curriculum MTW Part III Ch. 8, 11, (commentary 13 or 14)	Leading an article*	Readings: MTW Part III Ch. 8, 11, (commentary 13 or 14)
10/22/14* Suh at conference	Implemented: Teachers & Curriculum Webinar	Webinar Module	<u>Curriculum Design Research: Part 1 due*</u>
10/29/14	Teachers' Use of Curriculum Materials	Leading an article*	Readings: MTW Part IV

	MTW Part IV Ch. 15, 17, (commentary 18, or 19)		Ch. 15, 17, (commentary 18, or 19)
11/5/14	MTW, Part V Ch. 20, 21, 22 (commentary 23 or 24)	<i>Dissertation Presentations*</i>	<i>Dissertation Presentations*</i> Readings: MTW, Part V Ch. 20, 21, 22 (commentary 23 or 24)
11/12/14	Curriculum Comparison (Schmidt, Houang, & Cogan, 2002; Schmidt, Wang, & McKnight, 2005)	<i>Dissertation Presentations*</i>	<i>Dissertation Presentations*</i> Readings:(Schmidt, Houang, & Cogan, 2002; Schmidt, Wang, & McKnight, 2005)
11/19/14	Large Scale Studies (Harwell et al., 2007; Post et al., 2008)	Share Analysis from Enacted Lesson Study	<u>Curriculum Learning Analysis Due*</u>
11/26/14	No Class		
12/3/14	Research Symposium	Research Symposium	<u>Curriculum Design Research Final Paper due*</u>

Readings

- Clements, D. H. (2007). Curriculum research: Toward a framework for “Research-based Curricula.” *Journal for Research in Mathematics Education*, 38(1), 35-70.
- Cobb, P., & Jackson, K. (2011). Assessing the Quality of the Common Core State Standards for Mathematics. *Educational Researcher*, 40(4), 183 -185.
doi:10.3102/0013189X11409928
- Gutstein, E. (2003). Teaching and learning mathematics for social justice in an urban, latino school. *Journal for Research in Mathematics Education*, 34(1), 37-73.
- National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: Author.
- Porter, A., McMaken, J., Hwang, J., & Yang, R. (2011a). Common Core Standards. *Educational Researcher*, 40(3), 103 -116. doi:10.3102/0013189X11405038
- Porter, A., McMaken, J., Hwang, J., & Yang, R. (2011b). Assessing the Common Core Standards. *Educational Researcher*, 40(4), 186 -188.
doi:10.3102/0013189X11410232
- Post, T. R., Harwell, M. R., Davis, J. D., Maeda, Y., Cutler, A., Andersen, E., Kahan, J. A., et al. (2008). “Standards”-Based Mathematics Curricula and Middle-Grades Students’ Performance on Standardized Achievement Tests. *Journal for Research in Mathematics Education*, 39(2), 184-212.
- Remillard, J. T. (1999). Curriculum Materials in Mathematics Education Reform: A Framework for Examining Teachers’ Curriculum Development. *Curriculum Inquiry*, 29(3), 315-342.
- Remillard, J. T. (2000). Can Curriculum Materials Support Teachers’ Learning? Two Fourth-Grade Teachers’ Use of a New Mathematics Text. *Elementary School Journal*, 100(4), 331-50.

- Schmidt, W., Wang, H. C., & McKnight, C. C. (2005). Curriculum Coherence: An Examination of US Mathematics and Science Content Standards from an International Perspective. *Journal of Curriculum Studies, 37*(5), 525-559.
- Schoenfeld, A. (2002). Making mathematics work for all children: Issues of standards, testing, and equity. *Educational Researcher, 31*(1), 13-25.
- Stein, M. K., & Kaufman, J. H. (2010). Selecting and Supporting the Use of Mathematics Curricula at Scale. *American Educational Research Journal, 47*(3), 663-693.
- Stein, M. K., Remillard, J. T., & Smith, M. (2007). How curriculum influences student learning. In F. K. Lester (Ed.), *Second handbook of research on mathematics teaching and learning* (pp. 319-370). Charlotte, NC: Information Age Publishing.
- Stein, M. K., Grover, B. W., & Henningsen, M. (1996). Building Student Capacity for Mathematical Thinking and Reasoning: An Analysis of Mathematical Tasks Used in Reform Classrooms. *American Educational Research Journal, 33*(2), 455-488. doi:10.3102/00028312033002455