GEORGE MASON UNIVERSITY
COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT
GRADUATE SCHOOL OF EDUCATION
MATHEMATICS EDUCATION LEADERSHIP

EDCI 857 002: Preparation and Professional Development of Mathematics Teachers
Spring 2017, 3 Credits
Thursday at 4:30 Thompson L014

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Class meets: Thursday at 4:30

Course description

A. Prerequisites/Corequisites

This seminar is for students in the Mathematics Education Leadership Ph.D. program. Students study attributes of effective professional development in mathematics education, develop expertise in designing and teaching mathematics methods courses, and learn to create and teach professional development experiences for practicing teachers. Prerequisite: Admission to the Mathematics Education Leadership Ph.D. program.

B. University Catalog Course Description

Students study attributes of effective professional development in mathematics education, develop expertise in designing and teaching mathematics methods courses, and learn to create and teach professional development experiences for practicing teachers.

Learner Outcomes

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

1. Research and study design models for the delivery of mathematics professional development activities and research about mathematics teacher knowledge,
2. Test theories and techniques of mathematics professional development in field experiences with adult learners,
3. Develop expertise in designing and teaching mathematics methods courses and in organizing and teaching professional development experiences for practicing teachers,
4. Select and use technology to facilitate and support learning goals, and
5. Summarize and present the results of a pilot professional development activity in mathematics following its implementation.

Professional Standards

EDCI 857 is designed to enable mathematics education leaders to identify, develop and use instructional strategies consistent with the key attributes of effective professional development experiences for mathematics teachers. 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:

- Participate in mentored clinical experiences that develop expertise in designing and teaching mathematics content and methods courses for teachers,
- Organize and teach professional development experiences for practicing teachers,
- Demonstrate knowledge about research on teaching and teacher education,
- Articulate knowledge of historical, social, political and economic factors impacting mathematics education
- Become familiar with reports from major commissions, committees, and professional organizations,
- Help practicing teachers acquire knowledge of research on teaching and translate it to their own practice,
- Demonstrate confidence and competence in choosing and using effective instructional strategies consistent with mathematics learning goals, and
- Critically reflect about one's own teaching

Required Texts

Lester, F. (Ed.). (2008). *Handbook of research on mathematics teaching and learning*. Reston, VA: National Council of Teachers of Mathematics.

Loucks-Horsley, S. Love, N, Stiles, K., Mundry, S., & Hewson, P.W. (2008). *Designing professional development for teachers of science and mathematics.* Thousand Oaks, CA: Corwin Press, Inc.

Course Assignments

1. Position Statement Paper (10%)

In your position statement, briefly discuss your own professional preparation and professional development. How can we best prepare teachers and continue to develop them in the field? What role do you see yourself serving in preparing and developing teachers? If your PD had to have a focus, what would it be and why? Finally, what do you hope to gain from this course?

2. Teacher Knowledge, Learning and Development Literature Review Paper with Annotated Bibliography (25%)

In previous courses in the MEL doctoral program, you have investigated topics and developed annotated bibliographies based on research in the education community. The review of the research in this course will focus on mathematics teacher knowledge, learning and development. To extend that work and to help you to prepare for the literature review process for your dissertation, in this course you will be learning how to assemble literature, organize literature into themes, and

construct a literature review paper. The assignment will be completed progressively throughout the course with benchmark assignments.

3. Discussion Leadership Assignment (10%)
In order to engage you in synthesizing ideas across readings, each participant will be responsible for coordinating one class discussion (and/or some activity designed to support ideas presented in the readings) and supporting another of your fellow classmates in one other session related to the assigned readings. You will be required to complete a self-assessment of your role.

4. Professional Development Grant Proposal (25%)
As preparation for organizing projects and grants related to teacher professional development and research, you will write a 3–4 page idea paper outlining preliminary plans for a PD grant for a grant project of your choosing related to mathematics teaching.

You will submit a 10-12 page proposal to your instructor in April which will include a) Needs Assessment, b) Research Base, c) Description of Program Goals, Activities and Timeline, and d) Evaluation and Accountability Plan.

Professional Development Grant Proposal Guidelines:

1. Needs Assessment: A needs assessment should be included with a brief description of the methodologies used to collect this information.
2. Description of Program Goals, Activities and Timeline: This section should show a clear connection between project goals and planned activities, along with a description of the activities and how professional development needs are addressed. A clear description of the implementation plan, where the programs will be offered, and an activity timeline should also be addressed.
3. Research Base: A description of the demonstrated connection of project activities with scientifically-based research and appropriate methodology for project implementation. Provide a list of references and resources used to complete this narrative. .
4. Evaluation and Accountability Plan: Describe the plan that will be used to evaluate the program. This plan must include:
    a. rigorous measures of the impact that implemented intervention activities have on increasing student achievement in participating schools;
    b. a research design with measurable objectives to increase the knowledge of mathematics teachers who participate in content-based professional development activities;
    c. measures of progress towards meeting the assessed needs

5. Designing a Professional Development Session & Reflection (schedule session) (25%)

Design and deliver a Professional development session for local, regional, national conference/or teach a session in a methods course or a professional development course.

Map out a scope and sequence for a PD program. Elaborate on one of the module that will be implemented in a PD setting. The highlighted session will include the activities and annotations

for a professional development provider. After implementing the session, write a reflection and share out the major components of the PD that was successful in developing teacher knowledge through a PowerPoint and a brief paper integrating what you have read and the how the design and content reflections your understanding of effective professional development (Scope and sequence; Elaborated Module including a reflective paper 5-7 pages).

6. Curriculum Vitae and Cover Letter (5%)

You will update your curriculum vitae and write a cover letter describing your experiences as a mathematics educator.

NOTE: The instructor reserves the right to change the contents of this syllabus at any time and will announce such changes in a timely fashion.

Grading Policy

As a doctoral student, it is your job to learn as much as you can from this course, the assignments and the readings. The assignments have been designed to allow you to pursue independent interests within the boundaries of the topics of the course. The assignments and readings are also designed to help you both learn about the content of the course and develop your skills as a mathematics educator.

Grading Policies Graduate Grading Scale

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

Assignments are graded on a four-level scale: exceeds expectations, meets expectations, needs revision, and unacceptable. Specific requirements for each assignment will be provided with the assignment descriptions.

Policy on Incompletes:

If circumstances warrant, a written request for an incomplete must be provided to the instructor for approval prior to the course final examination date. Requests are accepted at the instructor's discretion, provided your reasons are justified and that a *majo*r percentage of your work has already been completed. Your written request should be regarded as a contract between you and the instructor and must specify the date for completion of work. This date must be at least two weeks prior to the university deadline for changing incompletes to letter grades.

TaskStream Requirements

Every student registered for any MEL course with a required performance-based assessment (will be designated as such in the syllabus) is required to submit this assessment (*Professional Development Grant Proposal*) to TaskStream (regardless of whether a course is an elective, a onetime course or part of an undergraduate minor). Evaluation of your performance-based assessment will also be provided using TaskStream. Failure to submit the assessment to TaskStream will result in a the course instructor reporting the course grade as Incomplete (IN). Unless this grade is changed upon completion of the required TaskStream submission, the IN will convert to an F nine weeks into the following semester.

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://coursessupport.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/.

Proposed Class Schedule: *Readings may be subject to change based on seminar discussions*

	Readings	Assignments
Session 1 1/26/17	**Overview and introduction** National Council for the Accrediation of Teacher Education. (2010). Transforming teacher education through clinical practice: A National Strategy to prepare effective teachers. Report of the Blue Ribbon Panel on Clinical Preparation and Partnerships for Improved Student Learning. Washington, DC: NCATE	Position Paper (Upload to Blackboard and bring to next class)
Session 2 2/2/17	**Teacher Education and the American Future** Darling-Hammond, L. (2010). Teacher education and the American future. *Journal of Teacher Education, 61*(1-2), 35–47. Lampert, M., Franke, M. L., Kazemi, E., Ghousseini, H., Turrou, A. C., Beasley, H., & Crowe, K. (2013). Keeping it complex: Using rehearsals to support novice teacher learning of ambitious teaching. *Journal of Teacher Education, 64*(3), 226–243. Zeichner, K. (2010). Rethinking the connections between campus courses and field experiences in college- and university-based teacher education. Journal of Teacher Education, 61(1-2), 89–99. doi:10.1177/0022487109347671 NCTM Website for the Council of the Accreditation of Educator Preparation (CAEP).	
Session 3 2/9/17 Online module	**Methods for Mathematics Teacher Preparation** **Online module- ANALYSIS of Method courses and syllabus** Greenberg, J., & Walsh, K. (2008). No common denominator: The preparation of elementary teachers in mathematics by American's education schools (Executive Summary). Washington, D.C., National Council on Teacher Quality.	

Session 4 2/16/17	**PCK, MKT, TCPK** Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15(2), 4-14. Ball, D. L., Thames, M. H., & Phelps, G. (2008). Knowledge for teaching: What makes it special? *Journal of Teacher Education, 59*(5), 389-407. Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? Contemporary Issues in Technology & Teacher Education, 9(1), 60–70. Loucks- Horsley, S. Love, N, Stiles, K., Mundry, S., & Hewson, P.W. (2008). *Designing Professional Development for Teachers of Science and Mathematics.* Thousand Oaks, CA: Corwin. (Chapter 1-2)	
Session 5 2/23/17	**Designing Professional Development** Loucks- Horsley, S. Love, N, Stiles, K., Mundry, S., & Hewson, P.W. (2008). *Designing Professional Development for Teachers of Science and Mathematics.* Thousand Oaks, CA: Corwin. (Chapter 3-4) *Examples of Professional Practice in the Literature* Boston, M. D. & Smith, M. S. (2009). Transforming secondary mathematics teaching: Increasing the cognitive demands of instructional tasks used in teachers' classrooms. *Journal for Research in Mathematics Education, 40* (2), 119-156. Lewis, C., Perry, R., & Murata, A. (2006). How Should Research Contribute to Instructional Improvement? The Case of Lesson Study. *Educational Researcher*, *35*(3), 3–14.	

Session 6 3/2/17	**Teacher Understanding of Mathematics** Loucks- Horsley, S. Love, N, Stiles, K., Mundry, S., & Hewson, P.W. (2008). *Designing Professional Development for Teachers of Science and Mathematics.* Thousand Oaks, CA: Corwin. (Chapter 5-6) Schoenfeld, A. (2014). What makes for powerful classrooms, and how can we support teachers in creating them? A story of research and practice intertwined. *Educational Researcher, 43*(8), 404–412.	
Session 7 3/9/17 (Spring Break is next week)	**Improving Classroom Instruction:** Hiebert, J., & Morris, A. (2011). Teaching, rather than teachers, as a path toward improving classroom instruction. *Journal of Teacher Education, 63*(2), 92-102. Related Commentaries: Lewis, C., Perry, R., Friedkin, S., & Roth, J. (2012). Improving teaching does improve teachers: Evidence from lesson study. *Journal of Teacher Education, 63, 368-375.* Lampert, M. (2012). Improving teaching and teachers: A "generative dance"? *Journal of Teacher Education, 63: 361-367.* Zeichner, K. (2012). The turn once again toward practice-based teacher education. *Journal of Teacher Education, 63, 376-382.* Kazemi, E., & Franke, M. L. (2004). Teacher learning in mathematics: Using student work to promote collective inquiry. *Journal of Mathematics Teacher Education, 7*, 203-235.	

Session 8 3/23/17	**Measuring Teacher Knowledge** ***Hill, H., Sleep, L., Lewis, J., & Ball, D. (2008). Assessing Teachers Mathematics knowledge: that knowledge matters and what evidence counts? In F. Lester (Ed.), *Handbook of Research on Mathematics Teaching and Learning* (pp. 1169-1207). Reston, VA: NCTM. http://www.highered.nysed.gov/TELDH.pdf Desimone, L., Smith, T., Phillips, K. (2013). Linking student achievement growth to professional development participation and changes in instruction: A longitudinal study of elementary teachers in Title I schools. *Teachers College Record, 115*, 1-46.	
Session 9 3/30/17	**Measuring Quality of Instruction and Video based PD** Es, E. A. van, Tunney, J., Goldsmith, L. T., & Seago, N. (2014). A Framework for the Facilitation of Teachers' Analysis of Video. *Journal of Teacher Education*, *65*(4), 340–356. https://doi.org/10.1177/0022487114534266 van Es, E. A. & Sherin, M. G. (2002) Learning to notice: Scaffolding new teachers' interpretations of classroom interactions. *Journal of Technology and Teacher Education, 10*(4), 571-596. Charalambous, C. (2010). Mathematical Knowledge for teaching and task unfolding: An exploratory study. *The Elementary School Journal, 110*(3), 247-278.	

Session 10 4/6/17	**Teacher Professional Learning** ***Franke, M., Kazemi, E., & Battey, D., (2007). Mathematics teaching and classroom practice. In F. K. Lester, Jr. (Ed.), *Second handbook of research on mathematics teaching and learning* (pp. 225-256). Reston: NCTM. Borko, H. (2004). Professional development and teacher learning: Mapping the Terrain. *Educational Researcher 33*(8), 3-15.	
Session 11 4/13/17	**Teacher Preparation and Professional Learning** ***Sowder, J. T. (2007). The mathematical education and development of teachers. In F. K. Lester, Jr. (Ed.), *Second handbook of research on mathematics teaching and learning* (pp. 157-223). Charlotte, NC: Information Age Publishers and National Council of Teachers of Mathematics. Lampert, M. (2010). Learning teaching in, from, and for practice: What do we mean?.*Journal of Teacher Education, 61*(1-2), 21-24. Kazemi, E., & Hubbard, A. (2008). New directions for the design and study of professional development: Attending to the coevolution of teachers' participation across contexts. *Journal of Teacher Education, 59*(5), 428-441. ..	

Session 12 4/20/17	**Teacher Beliefs & Identity** ***Philipp, R., (2007). Mathematics teachers' beliefs and affect. In F. K. Lester, Jr. (Ed.), *Second handbook of research on mathematics teaching and learning* (pp. 225-256). Charlotte, NC: Information Age Publishers and National Council of Teachers of Mathematics. Philipp, R. A., & Siegfried, J. M. (2015). Studying productive disposition: the early development of a construct. *Journal of Mathematics Teacher Education*, *18*(5), 489–499. Charalambous, C. Y. (2015). Working at the intersection of teacher knowledge, teacher beliefs, and teaching practice: a multiple-case study. *Journal of Mathematics Teacher Education*, *18*(5), 427–445. Jacobson, E., & Kilpatrick, J. (2015). Understanding teacher affect, knowledge, and instruction over time: an agenda for research on productive disposition for teaching mathematics. *Journal of Mathematics Teacher Education*, *18*(5), 401–406.	
Session 13 4/27/17	**Large Scale Studies of Professional Development** Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal, 38*(4), 915-945. Heck, D. J., Banilower, E. R., Weiss, I. R., & Rosenberg, S. L. (2008). Studying the effects of professional development: The case of the NSF's local systemic change through teacher enhancement initiative. *Journal for Research in Mathematics Education, 39*(2), 113-152. Garet, M.S., Wayne, A. J., Stancavage, F., Taylor, J., Eaton, M., Walter, K..& Warner, E. (2011). *Middle school mathematics professional development impact study: Findings after the second year of implementation.* Washington, DC: National Center for Educational Statistics & U. S. Department of Education.Executive Summary (pp. xv-xxviii). Professional Development Session & Reflection-Class Presentations	

Session 14 5/4/15	**International Perspectives on Teacher Learning** *Excerpts from* Sahlberg, P., & Hargreaves, A. (2011). *Finnish lessons: What can the world learn from educational change in Finland?* New York: Teachers College Press. Ma, L. (1999). *Knowing and teaching elementary mathematics: Teachers' understanding of fundamental mathematics in China and the United States*. Mahwah, N.J: Lawrence Erlbaum Associates. Professional Development Session & Reflection-Class Presentations	
Session 15 5/11/17	**International Perspectives on Teacher Learning** **Readings from International Handbook** Professional Development Session & Reflection-Class Presentations	