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**GEORGE MASON UNIVERSITY
COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT
Division of Elementary, Literacy and Secondary Education**

**EDPD 502.6R4: Learning and Doing Mathematics in Grades K-2
Spring/2017
Monday/4:30-7:30 PM
January 9 – May 15, 2017
Edward L. Kelly Leadership Center/Room 2002-2004**

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COURSE DESCRIPTION:

Learning and Doing Mathematics in Grades K-2 is a comprehensive study of early numeracy and its application in K-2 classrooms. Using research in early numeracy and applications with young children with diagnostic assessments and videotaped lessons, this course will increase teachers' content knowledge and the pedagogical background needed to teach mathematics effectively to young learners. Teachers will learn to assess for student thinking about number, and through readings and activities will learn to develop these concepts in depth. Teachers will further develop their knowledge of early mathematics and the issues that interfere with student understanding of this mathematics.

COURSE PURPOSE AND INTENDED AUDIENCE:

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Results of national and international assessments in mathematics achievement point to the need for reform of mathematics instruction for elementary students. This course is designed to increase teachers' knowledge of mathematics and the hierarchy of sophistication of children's strategies in early numeracy.

Learning and Doing Mathematics in Grades K-2 is based on the principles of both *Math Recovery* and *Assessing Math Concepts*. It involves a comprehensive study of early numeracy and its application in an inquiry-based classroom. The primary focus of this 3-credit graduate course is to increase both the content knowledge of teachers and the pedagogical background needed to teach effectively in an inquiry-based K-2 mathematics classroom. The course relies heavily on recent research in numeracy and builds from diagnostic assessments developed by Wright, Stafford, and Martland and by Kathy Richardson. The assessments focus on the sophistication of strategies students use to solve problems in the area of early numeracy. Teachers will develop ease with assessments to diagnose difficulties in mathematics and strategies to remediate these difficulties. Through readings, activities, discussions, and online modules, teachers will learn to develop in-depth understanding of student thinking about number concepts. During this class, teachers will learn research-based methods for teaching mathematics for understanding and will videotape their work with students on assessments and activities.

COURSE FORMAT:

Class meetings will be structured for maximum teacher participation. Each class will begin with discussion of mathematical topics and readings. The focus of the mathematical content will be based on the readings assigned. Mathematical problems, activities, and lessons supporting these concepts will be modeled, practiced, and discussed.

STUDENT OUTCOMES:

The primary focus of this course is to increase both the content knowledge of teachers and the pedagogical background needed to teach effectively in an inquiry-based K-2 mathematics classroom. Teachers will develop ease with assessments to diagnose difficulties in mathematics and with research-based methods for remediating these difficulties and for teaching mathematics for understanding. Through readings, activities, discussions, and online modules, teachers will learn to develop in-depth understanding of student thinking about number concepts. Teachers will videotape their work with students on assessments and related activities/lessons.

Course Objectives

Upon completion of the course, participants will

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- Have a working knowledge of assessment instruments designed to determine students' stages and levels of mathematical knowledge of numeration and computation in grades K-2;
- Focus their attention on children's strategies used to solve problems;
- Learn strategies for teaching, remediating, and enriching concepts of early numeracy;
- Have a working knowledge of the latest research in best practices for mathematics instruction for young children.

PROFESSIONAL STANDARDS (if applicable):

National Board for Professional Teaching Standard, Core Proposition 2

INTASC Standard _____

TESOL Standard _____

REQUIRED/SUPPLEMENTAL/RECOMMENDED TEXTS AND/OR READINGS:

Required Texts (Provided free of charge to all enrolled participants)

Kilpatrick, Jeremy and Swafford, Jane (Ed.) (2002). *Helping Children Learn Mathematics*. Washington, DC: National Research Council.

Richardson, Kathy. (2012). *How Children Learn Number Concepts: A Guide to the Critical Learning Phases*. Bellingham, Washington: Math Perspectives Teacher Development Center.

Wright, Robert J. et al. (2014). *Teaching Number in the Classroom with 4-8 Year Olds*. London: Sage Publications.

Supplemental Texts

Chapin, S.H. and Johnson, A. (2006). *Math Matters: Understanding the Math You Teach Grades K-8*. Sausalito, CA: Math Solutions Publications.

Wright, Robert J. et al. (2006). *Early Numeracy: Assessment for Teaching and Intervention*. London: Paul Chapman Publishing.

Wright, Robert J. et al. (2006). *Teaching Number: Advancing Children's Skills and Strategies*. London: Paul Chapman Publishing.

Recommended Reading

Selected readings pertaining to early mathematics acquisition and instruction from a variety of sources, including *Teaching Children Mathematics* (NCTM) and *Journal for Research in Mathematics Education* (NCTM).

COURSE REQUIREMENTS, PERFORMANCE-BASED ASSESSMENTS, EVALUATION CRITERIA, AND GRADING SCALE:

Discussion Leader (5 points) – Complete and reflect on a chapter or an activity and/or assessment from the text.

During the course of the semester, each participant will be responsible for a selected reading in the text. Reflections on the reading and activity/assessment, where applicable (including discussion of relevance to the teacher's professional growth, changes in student behavior, and

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student mathematical growth) will be posted to the MAT 220.2 Staff Communities Discussion Forum.

Reading Responses (5 points each week) – All participants will read and respond in writing on the Discussion Forum to reflections posted by at least two Discussion Leaders per week. Reading responses will include relevance to the teacher’s professional growth, possible changes in their own students’ behavior, and mathematical growth that might occur with their students if ideas in the reading(s) are implemented. All points in reflections must be supported, informally, with references from the article.

Research Update (4 points per update) – Share readings and research on topics of personal interest.

For designated class periods, participants will be assigned between-session reading of a relevant article or other independent reading, drawn from current research, teaching, or commentary in mathematics education, to be shared and discussed as a class or in groups.

Assessment and Activity Videos (10 points per assignment) – Videotape administration of one *Math Recovery* and one *Assessing Math Concepts* Assessment and instruction using related activities.

Each participant will conduct and videotape one assessment and one activity from each of the texts with a student or small group of students, and reflect on the activity/assessment. Videos and reflection/commentary will be shared with the class for discussion.

End of Course Project Options (15 points)

A. Inquiry-Based Guided Math Plan and Summary – Write a plan for an inquiry-based guided math class block, conduct the class, and write a reflection upon completion.

Plan will be written in one of a choice of formats provided or selected by the teacher and will be conducted within a specified timeframe. Reflection should be an informal description of the actual class after it is completed. Particular emphasis should be placed on the teacher’s professional pedagogical growth, including unexpected occurrences or outcomes, what would be done differently if done again, future plans for similar/different guided math class, etc.

OR

B. Mini-Conference Presentation - Develop a 10-15 minute presentation, in the form of a conference presentation.

The presentation will be on a topic of interest to the presenter that is relevant to the course and participants. The presentation will be prepared and delivered to the class, and should include any presentation materials necessary to accomplish the objectives of the presentation. Participant should be engaged in activities that are relevant and productive to the objectives of the course. Follow-up reflection by the presenter should include discussion of presenter’s growth as a result of planning and presenting the session, description of unexpected outcomes or occurrences, what would be done differently if the session were presented again, etc.

Evaluation Criteria – Each class attended is assigned a point value of 6 points. Each assignment is assigned a point value will be evaluated based on an *assignment-specific rubric*. Rubrics will be provided to students at the first class.

(EXAMPLE)

RUBRIC FOR CHAPTER DISCUSSION LEADER

(5 points)

MAT 220.1

**EACH PARTICIPANT IS RESPONSIBLE FOR SERVING AS AN ONLINE
DISCUSSION LEADER AND IN-CLASS DISCUSSION SUPPORT**

FOR ONE CLASS PERIOD.

Criteria	Meets Requirements (A, A-)	Needs Improvement (B+, B, C)
Conduct Activity/ Assessment	Read and reflect on related Math Recovery assessment and activity as they relate to your teaching in the selected chapter in <i>Teaching Number in the Classroom with 4-8 year olds</i> . OR Read and reflect on Critical Learning Phases as they relate to your teaching in the selected chapter in <i>How Children Learn Number Concepts</i> .	Reading/Activity/Assessment not completed by the date selected ; Reading/Activity/Assessment not completed .
Professional Quality	The discussion posting reflects thoughtful consideration of the key points brought out in the chapter, and includes commentary on relevance to the teacher's professional growth, observed or potential changes in their own students' behavior as a result of acting on ideas addressed in the reading, and mathematical growth that might occur with their students if ideas in the reading(s) are implemented. All points in reflections must be supported, informally, with references to the chapter.	The summaries are not written in a professional manner and contain spelling, AND/OR grammar, AND/OR language mechanics errors.
Post Results and Reflections	Summary, notes, results, and reflections of reading, activity, and assessment are posted on class Discussion Forum by the date assigned.	Results, reflections, etc. are not posted by the date assigned ; Results, reflections, etc. are not posted .
Support In-Class Discussion	Discussion Leader supports the in-class discussion about the reading, activity, assessment, etc. on date due.	Limited or no in-class discussion support.

GRADING SCALE:**A=93%-100%=225-241 points****A-=90%-92%=217-224 points****B+=87%-89%=210-216 points****B=83%-86%=200-209 points****B-=80%-82%=193-199 points****C=70%-79%=169-192 points****F=Below 70%=<169 points****GEORGE MASON UNIVERSITY COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT STATEMENT 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.

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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 Disability Resource Center (DRC) and inform the instructor, in writing, at the beginning of the semester. See www.gmu.edu/student/drc or call 703-993-2474 to access the DRC.

MAT 220.1 CLASS SCHEDULE Spring 2017

LAST DAY TO DROP CLASS WITHOUT ACADEMIC PENALTY IS BEFORE 20% OF THE CLASS SESSIONS HAVE MET (NLT Jan. 30, 2017).

CLASS	DATE	TOPIC/LEARNING EXPERIENCES	READINGS/ASSIGNMENTS
1	Jan. 9	Introduction: The Critical Learning Phases <i>Landscape of Learning</i>	Read <i>How Children Learn</i> p. v-vi and Introduction
2	Jan. 23	The Teacher as a Learner Mathematical Proficiency Number Words and Numerals	Read <i>Teaching Number</i> Ch. 11 & 3 Respond to Class 1 <i>sample</i> posting (TN Ch 3) Research Update #1
3	Jan. 30	Understanding Counting	Read <i>How Children Learn</i> Ch. 1 Respond to Class 2 posting Research Update #2

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4	Feb. 6	Understanding Number Relationships	Read <i>How Children Learn</i> Ch. 2 Respond to Class 3 posting Assessment Video #1
5	Feb. 13	Approaching, Organizing, & Designing Instruction (prep for <u>Activity Video</u>) Early Counting and Addition	Read <i>Teaching Number</i> Ch. 1 and 4 Respond to Class 4 postings Research Update #3
6	Feb. 27	Structuring Numbers 1 to 10	Read <i>Teaching Number</i> Ch. 5 Respond to Class 5 postings Activity Video #1
7	Mar. 4	BNVCTM Conference (Required)	Conference Reflection (due 3/13)
8	Mar. 13	Understanding Addition and Subtraction: Parts of Numbers	Read <i>How Children Learn</i> Ch. 3 Respond to Class 6 postings Conference Reflection
9	Mar. 20	Understanding Place Value: Tens and Ones	Read <i>How Children Learn</i> Ch. 4 Respond to Class 8 postings Research Update #4
10	Mar. 27	Advanced Counting: Addition and Subtraction	Read <i>Teaching Number</i> Ch. 6 Respond to Class 9 postings Research Update #5
11	Apr. 3	Structuring Numbers 1 to 20	Read <i>Teaching Number</i> Ch. 7 Respond to Class 10 postings Assessment Video #2
12	Apr. 24	Understanding Place Value: Hundreds, Tens, and Ones	Read <i>How Children Learn</i> Ch. 5 Respond to Class 11 postings Research Update #6
13	May 1	2-digit Addition and Subtraction: Jump Strategies <i>and</i> ...Split Strategies	Read <i>Teaching Number</i> Ch. 8 and 9 Respond to Class 12 postings Activity Video #2
14	May 8	Early Multiplication and Division Understanding Multiplication and Division	Read <i>Teaching Number</i> Ch. 10 Read <i>How Children Learn</i> Ch. 6 & Appendix Respond to Class 13 postings Guided Math Class Plan and Reflection OR Mini Conference Presentation
15	May 15	Summarizing the Big Ideas	Respond to Class 14 postings All incomplete assignments due