

Teaching Mathematics in the Elementary School

15:245:543:01, 3 credits

Fall 2016, T 7:40-10:20

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Office Hours: GSE 229C T: 2-4 or by appointment	Prerequisites or other limitations: 05:300:200 and admission to the program
Mode of Instruction: <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Seminar <input type="checkbox"/> Hybrid <input type="checkbox"/> Online <input type="checkbox"/> Other	Permission required: <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentations: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.

Learning goals:

This course has been designed to focus both on the details of children's mathematics thinking, as well as how to use student thinking as a way to ground learning about the teaching of mathematics. The class will focus on preparing you to begin your career and learn as you teach. As we address student thinking and instructional routines we will also discuss ways to accommodate various learners and critical aspects of the teaching and learning of mathematics and: *equity (racial, ethnicity, SES, gender, language, (dis)ability), the use of mathematical tools, and pedagogically meeting the needs of all students*. We will specifically discuss pedagogical strategies to support English Language Learners (ELLs). We will use the state content standards, readings, student work, classroom video, curricula, your practicum placement, instructional scenarios, including designing and implementing lessons to examine these issues. Additionally, we will discuss the Common Core State Standards for Mathematics (CCSSM), Student Growth Objectives (SGOs), PARCC (the new state assessment), and Danielson's Framework for Teaching (FFT) in preparation for your future work in schools.

To develop:

- knowledge of the mathematics in the elementary grades
- detailed knowledge about the development of children's mathematical thinking
- ways to build instruction based on the development of students mathematical thinking
- a repertoire of pedagogical techniques and routines related to the above

- an understanding of equity and access inside and outside of the mathematics classroom and modifications for various learners

Continue to reflect on your role as a mathematics teacher within a community.

Course catalog description:

Concrete, manipulative approach to teaching mathematics concepts. Psychology of learning mathematics; the elementary curriculum; effective teaching techniques.

Course materials:

Carpenter et al. (1999). **(CM)** Children’s Mathematics: Cognitively Guided Instruction. Heinemann. (ISBN: 978-0325001371)

Coggins et al. (2007). **(ELs)** English Language Learners in the Mathematics Classroom. Corwin Press. (ISBN: 978-1483331782)

Featherstone et al. (2011). **(ST)** Smarter Together: Collaboration and Equity in the Elementary Classroom. Reston, VA: National Council of Teachers of Mathematics.

Other readings will be available electronically

Common Cores State Standards for Mathematics (CCSSM):

<http://www.corestandards.org/math>

New Jersey Teaching Professional Standards addressed in this course:

Standard 1. Learner Development	The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary
Standard 2. Learning Differences	The teacher uses understanding of individual differences and diverse cultures and communities to ensure inclusive learning environments that enable each learner to meet high standards.
Standard 3. Learning Environments	The teacher works with others to create environments that support individual and collaborative learning, and that encourage positive social interaction, active engagement in learning, and self motivation.
Standard 4. Content Knowledge	The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches, particularly as they relate to the Common Core Standards and the New Jersey Core Curriculum Content Standards and creates learning experiences that make these aspects of the discipline accessible and meaningful for learners to assure mastery of the content.
Standard 5. Application of Content	The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.
Standard 6. Assessment	The teacher understands and uses multiple methods of assessment to engage learners in examining their own growth, to monitor learner progress, and to guide the teacher’s and learner’s decision-making.

Standard 7. Planning for Instruction	The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.
Standard 8. Instructional Strategies	The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways
Standard 9. Professional Learning	The teacher engages in ongoing individual and collaborative professional learning designed to impact practice in ways that lead to improved learning for each student, using evidence of student achievement, action research, and best practice to expand a repertoire of skills, strategies, materials, assessments, and ideas to increase student learning

Council for the Accreditation of Educator Preparation (CAEP) Standards:

Standard 1. Content and Pedagogical Knowledge	The provider ensures that candidates develop a deep understanding of the critical concepts and principles of their discipline and, by completion, are able to use discipline-specific practices flexibly to advance the learning of all students toward attainment of college- and career-readiness standards.
Standard 2. Clinical Partnerships and Practice	The provider ensures that effective partnerships and high-quality clinical practice are central to preparation so that candidates develop the knowledge, skills, and professional dispositions necessary to demonstrate positive impact on all P-12 students' learning and development.
Standard 3. Candidate Quality, Recruitment, and Selectivity	The provider demonstrates that the quality of candidates is a continuing and purposeful part of its responsibility from recruitment, at admission, through the progression of courses and clinical experiences, and to decisions that completers are prepared to teach effectively and are recommended for certification. The provider demonstrates that development of candidate quality is the goal of educator preparation in all phases of the program.
Standard 4. Program Impact	The provider demonstrates the impact of its completers on P-12 student learning and development, classroom instruction, and schools, and the satisfaction of its completers with the relevance and effectiveness of their preparation.
Standard 5. Provider Quality Assurance and Continuous Improvement	The provider maintains a quality assurance system comprised of valid data from multiple measures, including evidence of candidates' and completers' positive impact on P-12 student learning and development. The provider supports continuous improvement that is sustained and evidence-based, and that evaluates the effectiveness of its completers. The provider uses the results of inquiry and data collection to establish priorities, enhance program elements and capacity, and test innovations to improve completers' impact on P-12 student learning and development.

Course assignments:

Attendance (this policy is separate from the participation grade): You are allowed ONE absence, which I will assume is for a good reason. Beyond that, your final grade will be reduced as indicated (unless, of course, you have a doctor's note or other documentation indicating a bona fide reason): 2 absences—reduction of a half grade; 3 absences—reduction of 1 full grade; 4 absences—failing grade in course. Again, if it is an excused absence, you are responsible for contacting me, getting the course materials, and making up for the class in order to receive the participation points.

Class Participation (30 points): You are expected to participate in class. Each week you will have readings and you will need to be prepared to discuss the content of the readings and ask questions in class. Aside from the readings, we will be engaging in many discussions, group work, and individual activities in class. Your engagement in the course determines how successful the class will be and how much you will learn. You can earn a maximum of 2 points each class for in-class participation, individual assignments, completing the readings, and completing group work. **If you miss a class for an excused absence, you can make up the points by doing out of class activities.** We only have 45 hours to explore different ways to think and teach mathematics and then you need to be able to teach math on your own! We need to make the most of this limited time together.

Discussion Board Postings (15 points): Each student is required to make 6 postings on the Sakai discussion board. You will be given topics to investigate (e.g. questioning, group work) each week in your practicum placement. You can choose the 6 weeks you want to post on the discussion board. Postings will need to be completed by Friday at 5pm. You will receive points for your postings if they are thoughtful and relate to class topics.

To maintain high quality discussions, here are some guidelines:

- Post in a timely manner. Do not save course reading or postings until the last minute. Because part of your responsibilities will include responding to your peers' posts, a late post can jeopardize your peers' contributions and grades.
- Provide thoughtful, detailed responses to questions and your peers' posts. It is necessary to support your opinions and ideas with material from our class readings and discussions.
- Use academic language (not "texting language" you might use on a cell phone with friends) for your on-line contributions. Make sure you cite material/text/concepts from other sources.

Family Math Night (15 points): You will participate in the design and carrying out of Family Math Night in groups at your practicum placement school. Of course this should be fun for parents, but the main goal is to help parents both think about critical mathematical ideas as well as find new ways to support their children in understanding mathematics. You will turn in the activity you designed as well as a 2-page description of how it met the goals of the assignment. This may be an artifact that you choose to submit to the Teachscape portfolio exemplifying professionalism for FFT domain 4 (particularly 4c).

Group Lesson Plan (15 points): You will be asked to develop a lesson plan in groups. Some time will be provided in class to work on this assignment. I will then give you feedback on the lesson plan. The goal is to demonstrate an understanding of the pedagogy discussed in class and to make the mathematics meaningful for students. Additionally this will prepare you for the Mathematics Lesson you will teach in your practicum. A rubric, template, and write-up examples will be posted on Sakai.

Mathematics Lesson (45 points):

This has three parts, a lesson plan that needs to be approved by your practicum teacher, a video of yourself teaching the lesson, and a reflection on the lesson. ***All three parts will be submitted to your Teachscape portfolio.***

Individual Lesson Plan (15 points): You will each write a lesson to be taught in your practicum classroom. Using what you learned from the group lesson plan, you will need to write a lesson plan that exemplifies teaching mathematics for understanding and have your practicum teacher approve

and provide feedback on the lesson before you teach it in the classroom. The lesson plan will be rated primarily using FFT domain 1.

Teaching video (15 points): The video does not need to show students, but does need to show you as the teacher practicing the pedagogy we've discussed in class in terms of modeling, questioning, assessing students, and providing feedback. The video will be rated primarily using FFT domains 2 & 3.

Teaching Reflection (15 points): You are responsible to get feedback from a classmate on the video of the lesson. This should be written up in 1-2 pages. In addition to submitting this, you need to read their comments and reflect on details of the video including students' thinking, the depth of the mathematics content covered, and your instruction practices. You should cite specific times in the video where you think you demonstrate teaching practices that are exemplary and areas where you could improve. The goal is to show you can be reflective and critical of yourself, but also that you know the types of instructional practices that produce substantive students learning in mathematics. The reflection should be 4-5 pages double-spaced. The reflection will be rated primarily using FFT domain 4a.

Group Curriculum Development Project (30 points): You will revise a chapter in groups from an existing elementary mathematics curriculum. The focus of the curriculum development project is to meaningfully adopt, refine, and supplement existing curricular resources in ways that are aligned with children's mathematical thinking. A description of the sequence of lessons, important content covered, and forms of student assessment must be provided. Your group's project submission must highlight where and how mathematical problem solving plays a role in supporting children's learning through the curriculum sequence. It is highly recommended to turn this in to the instructor for feedback before submitting it for a final grade. A rubric and template will be posted on Sakai.

Grading policy:

The grading will be as follows-

A = 100-90%	B+ = 89-87%
B = 86-80%	C+ = 79-77%
C = 76-70%	D = 69-60%
F < 60%	

If you need ANY special accommodations during the course, please see me after the FIRST class.

Academic Integrity

The highest standards of academic integrity are expected of all students. The failure of any student to meet these standards may result in suspension or expulsion from the university and/or other sanctions as specified in the academic integrity policies at Rutgers University.

Violations of academic integrity include, but are not limited to: cheating, fabrication, tampering, plagiarism, stealing, or facilitating such activities. The university academic integrity policies are available at the link below:

<http://academicintegrity.rutgers.edu/academic-integrity-policy/>

Course Schedule (subject to change depending on weather, pacing, and student learning):

Class Date	Topic and Standards	Readings	Assignments
Week 1	Introduction, Problem Solving, Making Mathematics Meaningful		
Week 2	Fair Sharing, Multiple	CM: Introduction ST: Foreword Sakai: Franke	
Week 3	Common Denominators, Mathematical Competence	Sakai: Empson 1 ST: Ch 1 Sakai: Battey 1	
Week 4	Fraction Addition/ Subtraction,	Sakai: Empson 2 Sakai: Steencken	
Week 5	Fraction Multiplication/ Division, Tools and Status, and Teaching for development differences	ELLs: Ch 4 ST: Ch 2 Sakai: Behrend Sakai: Witzel	
Week 6	Multiplication and Division Strategies & Problem Types, Questioning, Classroom Norms	ELLs: Ch 6 ST: Ch 3	
Week 7	Multi-digit Multiplication, Representations, and Building on student lives	CM: Ch 4 ELLs: Ch 5 Sakai: Civil	Group Lesson Plan Due
Week 8	Multi-digit Division Strategies, Addressing Status	Sakai: Parker ST: Ch 5 & 6	
Week 9	Addition and Subtraction Strategies & Problem Types, Counting Group Work, Designing Tasks and Assessment	CM: Ch 1 ST: Ch 4 & 7 Sakai: Assessment	
Week 10	Addition & Subtraction Student Strategies, Counting, Strategies for ELLs, and Multicultural connections	CM: Ch 2 ELLs: Ch 2 Sakai: Chappell	Math Lesson Due and Uploaded to Teachscape

Week 11	Counting and Multi-digit Strategies, Mathematizing Social Issues	CM: Ch 3 Sakai: Schwerdtfeger Sakai: Gutstein	
Week 12	Children's Multi-digit Strategies, Mathematical Tools and Technology	CM: Ch 6 Sakai: Friel	
Week 13	Algebraic Thinking & Relational Thinking, Scaffolding	CM: Ch 7 Sakai: Carpenter 1 ELLs: Ch 3	
Week 14	Geometry, Using Tools, and Differentiating Instruction	Sakai: Taylor-Cox ELLs: Ch 1	Final Curriculum Development Project Due