

**The Teaching Mathematics in PK & Elementary 1:**

**Operations, Algebra and Place Value**

**[15:251:561:94](#)**

**2 Credits**

**Fall 2021**

**Wednesday 1:00pm - 4:00pm**

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Room: n/a

Office Hours: by appointment via  
Zoom or FaceTime

Prerequisites or other limitations:  
Admission to the program

Mode of Instruction:

Permission required:

Lecture

No

Seminar

Yes

Hybrid

Online

Other

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 documentation. 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>.

If you require any accommodations, please inform me prior to or immediately following the first class.

### **Learning goals:**

Students will develop:

- knowledge of the mathematics in the early 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 including forms of assessment as well as how to leverage instructional materials for these goals;
- an understanding of equity and access inside and outside of the mathematics classroom and modifications for various learners; and
- opportunities to reflect on your role as a mathematics teacher within a community.

### **Course catalog description:**

This course focuses on the details of children's mathematics thinking, as well as on how to use student thinking to ground learning about the teaching of mathematics. As we address student thinking and instructional practices 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 and pedagogical tools for meeting the needs of all students. We will use the state content standards, readings, student work, classroom video, curricula, practicum placements, instructional scenarios, as well as designing and implementing lessons to examine these issues. The course will help you think about implementing mathematics instruction that is conceptually focused.

### **New Jersey Teaching Professional Standards addressed in this course:**

**Standard 1.** The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary

Learner  
Development

**Standard 2.** 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.

Learning  
Differences

- Standard 3.** 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.
- Learning  
Environment  
s
- Standard 4.** 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.
- Content  
Knowledge
- Standard 5.** 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.
- Application  
of Content
- Standard 6.** 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.
- Assessment
- Standard 7.** 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.
- Planning for  
Instruction
- Standard 8.** 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
- Instructional  
Strategies

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

**Standard 1.** 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.

Content and Pedagogical Knowledge

**Standard 2.** 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.

Clinical Partnerships and Practice

**Standard 3.** 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.

Candidate Quality, Recruitment, and Selectivity

**Standard 4.** 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.

Program Impact

**Standard 5.** 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.

Provider Quality Assurance and Continuous Improvement

**Course materials:**

Carpenter et al. (1999). **(CM)** Children's Mathematics: Cognitively Guided Instruction (**2<sup>nd</sup> Edition**). Heinemann. (ISBN: 978-0-325-05287-8)

Coggins et al. (2007). **(EL)** English Language Learners in the Mathematics Classroom. Corwin Press (1<sup>st</sup> or 2<sup>nd</sup> Edition). (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.

**New Jersey Student Learning Standards – Mathematics:**

<https://www.state.nj.us/education/aps/cccs/math/>

*Other resources and readings will be available electronically on our Canvas site.*

**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, providing the necessary documentation, and making up for the class in order to earn participation points.

**Class Participation (20 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 with classmates and in online discussions. It's important that you formulate and ask questions. Aside from relating to the course texts, we will be working on collaborative activities in pairs and small groups. There will be individual tasks, such as contributing to Threaded Discussions, as well. 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 - evidenced by completed assignments, engagement with your peers and contributions to group activities.
- We only have 30 hours this semester to explore how children think mathematically, as well as explore effective ways to promote mathematical thinking and learning! We need to make the most of this limited time together.

**Curriculum Review (15 points for paired critique + 5 points for individual reflection = 20 points):**

- In pairs, you will critique an existing curricular lesson plan and its resources. Initially, highlighting any of the ways the lesson plan attempts to utilize children's mathematical thinking and patterns of learning, or fails to do so.
- Then you will identify and categorize how the lesson aligns with essential instructional elements of *Teaching for Understanding* [differentiation, relevance, hands-on exploration, student choice and direction, etc.].
- You will provide recommendations for at least five ways to improve the lesson plan so it more closely supports *Teaching for Understanding*.
- Lastly, you are to write a 1-2 page reflection on the process of evaluating the lesson plan and developing effective alternatives.

**Instructional Practices Video Analysis (30 points):**

- You will analyze a video lesson during the semester. The analysis will focus on various pedagogical elements for effective mathematics instruction and student learning.
- In addition, you will make specific instructional recommendations for transforming the classroom into one that engages in more substantive mathematical learning and a more equitable classroom space.

**Assessment of Student Work (30 points):**

During the assignment, you will begin to develop the knowledge and skills needed to identify student thinking (avoid focusing on what's incorrect or missing) and trajectories of mathematics learning. You will then practice using this knowledge to create learning opportunities to develop student understanding.

- In a small group, you will analyze student work samples in order to
  - detail the specific knowledge evidenced,
  - place the student in terms of where they are in a pattern of learning, and
  - identify specific goals and plan for instructional strategies to develop each student's mathematical conceptual understanding.

The goal of these assignments is to provide evidence of your growing knowledge of instructional practices, how to engage students in ways consistent with the NJ State Standards for Mathematical Practice, and ways to design mathematics tasks for developing understanding. Additionally, you are to show knowledge of instructional practices that take a resource (as opposed to a deficit perspective) of students' experiences, how to support multiple forms of student participation in mathematics, and attention to student interactions that can be shaped by issues of power such as race, gender, language, and status.

**Grades:**

A = 100-90%

B+= 89-87%

B = 86-80%

C+= 79-77%

C = 76-70%

D = 69-60%

F &lt; 60%

**Course Schedule** (subject to change depending on instructional pacing & student learning)

<b>Class Date</b>	<b>Topic and Standards</b>	<b>Readings FOR Class</b>	<b>Assignment Due Dates</b>
Week 1 9/1	Math Experiences & Assumptions  Complex Instruction  Cognitive Demand of Word Problems	NCTM Statement  CM: Intro & Ch 1	FYI: Threaded Discussions are due by midnight on Tuesday, <b>before</b> class.  All other assignments are due by midnight Wednesday or Thursday..
Week 2 9/15	Counting Problem Types  NJ State Standards  Curricula Review	CM: Ch 2  Canvas: Baroody  Canvas: Parrish	<b>Threaded Discussion One due by 11:59 PM on 9/14</b>
Week 3	Developing Number Sense	ST: Intro & Ch 1  EL: Ch 2 <b>OR</b> Ch 4	<b>Threaded Discussion Two due by 11:59 PM on 9/21</b>

9/22 Strategies for  
ELLs

Curricula  
Review

Week  
4

Addition &  
Subtraction  
Strategies

CM: Ch 3

ST: Ch 2

**Curriculum Review Due by 11:59 PM**

9/29

Mathematics  
Status

Observation &  
Analysis

Week  
5

Counting and  
Place Value

CM: Ch 6

**Threaded Discussion Three due by  
11:59 PM on 10/5**

10/6

Children's  
Multi-digit  
Strategies

Canvas: Friel **or**

Canvas: Witzel & Allsopp

Base Ten  
Awareness

Observation &  
Analysis

Week  
6

Teacher  
Questioning

CM: Ch 7

**Curriculum Review Reflection Due  
by 11:59 PM**

Canvas: Friel

10/13

Building on  
Students' lives

Differentiation

Assessing  
Student Work



Week 7  10/20	Multiplication and Division Strategies & Problem Types  Complex Guided Instruction  Assessing Student Work	CM: Ch 4 & 5  EL: Ch 5	<b>Threaded Discussion Four due by 11:59 PM 10/19</b>
Week 8  10/27	Standard Algorithms  Modeling (not demonstrating)  Assessing Student Work	CM: Ch 8  ST: Ch 3 <b>OR</b> Ch 6	<b>Video Analysis One due by 11:59 PM</b>
Week 9  11/3	Algebra and Relational Thinking	CM: Ch 11  Canvas: Ambrose  Canvas: Truelove	<b>Threaded Discussion Five due by 11:59 PM 11/2</b>
Week 10  11/10	Interactional Dynamics  Equitable Classrooms	ST: Ch 5  Canvas: Battey	<b>Assessment of Student Work and Instructional Planning Due by 11:59 PM on Thursday 11/11</b>