RUTGERS
Graduate School of Education

Learning and Teaching
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15:251:575:A3 Teaching Mathematics in the Middle School
3 Credits

Instructor: Robert Sigley	Email: robert.sigley@gse.rutgers.edu
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Office Hours: Tuesday 1:30pm-3:30pm and by appointment Office: GSE 213	Prerequisites or other limitations: 05:300:200, admission to the program, and satisfactory completion of first year.
Mode of Instruction: ___ Lecture _x_ Seminar ___ Hybrid ___ Online ___ Other	Permission required: _x_ No __ Yes

Learning goals

I have designed this mathematics methods course 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 use the state content standards, readings, student work, classroom video, curricula, instructional scenarios, including designing and implementing lesson plans in your practicum placement to examine these issues.

Goals:

To develop:
- knowledge of the mathematics in the middle school 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
- a sense 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:

Addresses instructional strategies, curricula, and learning environments appropriate for the middle school child (grades 6-8).

Class materials:

There is no textbook for the class. All readings will be available on Sakai.

New Jersey Teaching Professional Standards addressed in this course:

Teachers know and understand:

1.1 In-depth the subject matter they plan to teach and the relationship of that discipline to other content areas;
1.2 The evolving nature of the discipline or subject matter knowledge and the need for keeping abreast of new ideas and understanding of the discipline;
1.4 Concepts inherent in numeracy to enable students to represent physical events, work with data, reason, communicate mathematically, and make connections within their respective content areas in order to solve problems.

Teachers value and are committed to:
1.5 Appreciating multiple perspectives and conveying to learners how knowledge is developed from the vantage point of the knower; and
1.6 Enthusiasm for the discipline(s) they teach and in making connections to every day life.

Teachers engage in activities to:
1.7 Promote the development of critical and creative thinking, problem-solving and decision-making skills by engaging students in formulating and testing hypotheses according to the methods of inquiry and standards of evidence within the discipline;
1.8 Make effective use of multiple representations and explanations of disciplinary concepts that capture key ideas and link them to students' prior understanding; and
1.9 Evaluate teaching resources and curriculum materials for their completeness, accuracy and usefulness for representing particular ideas and concepts.

Teachers know and understand:
2.1 How students construct knowledge, acquire skills and develop habits of mind and how to use instructional strategies that promote student learning;
2.2 How student learning is influenced by individual experiences, talents and prior learning, as well as language, culture, family, and community values; and
2.3 How to identify and teach to the developmental abilities of students, which may include learning differences, visual and perceptual differences, cultural and socio-emotional differences, special physical or emotional challenges and gifted and talented exceptionalities.

Teachers value and are committed to:
2.6 Appreciation for multiple ways of knowing;
2.7 The diverse talents of all students and to helping them develop self-confidence and subject matter competence; and
2.8 The belief that all children and adolescents can learn at high levels and achieve success.

Teachers engage in activities to:
3.9 Use strategies to support the learning of students whose first language is not English; and
3.10 Use knowledge of students and their lives to design and carry out instruction that builds on students' strengths while meeting their needs and taking into account issues of social class, gender, race, ethnicity, language, sexual orientation, age and special needs.

Teachers know and understand:
4.1 How to plan instruction based on students' needs, developmental progress and prior knowledge;
4.3 Techniques for modifying instructional methods, materials and the environment to help all students learn; and
4.4 A variety of instructional approaches and the use of various technologies, to promote thinking and understanding.

Teachers value and are committed to:
   4.5 The development of students' critical thinking, independent problem solving and performance
   capabilities.

Teachers engage in activities to:
   4.8 Evaluate teaching resources and curriculum materials for their comprehensiveness, accuracy and
   usefulness for representing particular ideas and concepts;
   4.9 Identify strategies to create learning experiences that make subject matter meaningful for students,
   address a variety of learning styles, encourage students to pursue their own interests and inquiries and
   help students connect their learning to personal goals;
   4.11 Use formal and informal methods of assessment, information about students, pedagogical
   knowledge, and research as sources for active reflection, evaluation and revision of practice; and

Teachers value and are committed to:
   5.3 The belief that students' strengths are the basis for growth and their errors are opportunities for
   learning.

New Jersey State Mathematics Standards in the course:
http://www.corestandards.org/the-standards/mathematics

Assignments:
Participation in your practicum (required): You will attend Linwood School in North Brunswick a
minimum of four times throughout the semester. You are required to be in the school for the entire
day. The dates will be provided to you by the GSE before the semester starts.

Class Participation (25%): You are expected to participate in class. 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. We only have a limited number of 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.

Practicum journals (25%): You will submit 4 one page entries chronicling your experience in the
classroom. Each journal entry should be a clear and well-written page and uploaded to Sakai. A
prompt will be provided for each journal which will allow you to reflect upon a different aspect of
your cooperating teacher, classroom, or reading from our course.

Task Development and Implementation (50% - 30% write up, 20% presentation): Each student will
develop, present, facilitate, and monitor a mathematical task with a small group of students (or, if
necessary, peers). The goal of the presented task should be to enact a productive mathematics
discussion among students.

Part I -- Preparation (30%, 1-3 pages)
A - "High-Level" Problem Task Statement – be ready to defend why your task would qualify as a
high-level task and categorize it using The Task Analysis Guide from Smith & Stein (1998) which
will be posted on Sakai
B - Anticipating – Anticipate all the ways in which students are likely to solve the task and the errors
that they might make.

C - Questioning – Based on what you anticipate will happen, write down questions you could ask about students about their approaches that could help them make progress on the task. Ask higher-level questions that go beyond gathering information or leading students through a procedure… think about how your questions will scaffold thinking to enable students to think harder and more deeply about the mathematical ideas in the lesson.

D - Monitoring sheet – Create a Monitoring sheet that you could use to record data during your lesson.

Part II – Implementation (20%)
Using your task, teach a problem-solving session with the students in the class for approximately 20 minutes. Use the monitoring questions developed from your presentation, with revisions as appropriate. Submit a paper with a summary of your implementation. The paper is due 6/25.

A note about assignments: As your instructor, I will give you feedback and comments on your homework and assignments. I view all assignments as measures of process, not final measures of knowledge. Just because an assignment is completed does not mean that you (or I) should stop thinking about the implications of the assignment. If you have additional ideas about assignments after they are due, I encourage you to share those with me. Ideas about teaching mathematics develop over time and cannot be conceptualized on a deadline. However, I do expect assignments to be completed on time so that I can see your progress.

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

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.

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: 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

Grading policy:

If you need ANY special accommodations during the course, please see me

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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%	

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

Class Date	Topic and Standards	Reading Assignment	Assignments Due
Class 1 T 5/26/15	Review of fraction as operator, fraction as number. (4.NF, 5.NF)	Read Benny, Skemp, and Wired (on Sakai) article by 5/28	Identify a task and difficulties students will have with the task, bring to class on 6/3
Class 2 W 5/27/15	Review of operations with fractions, decimals, and percents. Proportionality (6.RP, 7.RP)	Read Benny, Skemp, and Wired (on Sakai) article by 5/28	
Class 3 H 5/28/15	The number system (6.NS)	Read Sigley & Wilkinson (2015) for 6/2	
Class 4 T 6/2/15	Algebra: Variables and Patterns (6.EE)		
Class 5 W 6/3/15	Algebra: Functions (6.EE, 7.EE)		Bring your task to class, email it to me before class so I can make groups
Class 6 H 6/4/15	Algebra: Quadratics, radical and integer exponents (7.EE, 8.EE)	Read Weber et al (2010), Mueller & Maher (2009) for 6/9	
Class 7 T 6/9/15	Algebra: Simultaneous linear equations, connections between proportional relationships, lines, and linear equations (8.EE)		
Class 8 W 6/10/15	Review of measurement and geometry. Surface area and volume. Relationship between geometrical figures. (6.G)		
Class 9 H 6/11/15	Congruence and similarity using Geogebra, Pythagorean theorem (7.G)	Read Maher & Ahluwalia (2014) for 6/16	Task analysis due 6/14 (Sunday), I will return 6/15 early
Class 10 T 6/16/15	Statistical variability, distributions, random sampling, inferences (6.SP, 7.SP, 8.SP)		Prepare your presentation for 6/17, 6/18

Class 11 W 6/17/15	Lesson presentations	No readings	Present your task, implementation write up due 6/25
Class 12 H 6/18/15	**Lesson presentations**	**No readings**	Present your task, implementation write up due 6/25