RUTGERS
Graduate School of Education

Learning and Teaching
Graduate School of Education
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High School Mathematics Content: Teaching and Assessment
05:300:341, 3 Credits
Fall 2021, Wednesday 5:00-8:00

Instructor: Christian Orr-Woods	Email: christian.orrwoods@rutgers.edu
Office Hours Location: https://rutgers.zoom.us/j/92698671614?pwd=MnJObW1xYnFPSzFJYklieHVVTFBvZz09	Room: https://rutgers.zoom.us/j/92698671614?pwd=MnJObW1xYnFPSzFJYklieHVVTFBvZz09
Office Hours: Wednesday 1-4	Prerequisites or other limitations: Admission to the program
Mode of Instruction: _ _ Lecture __ Seminar ___ Hybrid _x_ Online ___ Other	Permission required: _x_ No __ 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:
Students will develop:
- a deep conceptual understanding of core mathematics concepts in the high school curriculum;
- the principles of designing lesson plan to teach for conceptual understanding, with an emphasis on learning objectives, assessment, and reflection;
- a repertoire of pedagogical techniques to teach for conceptual understanding, including the use of manipulatives, technology, multiple representations, and guided discovery;
- an introduction to state standards, particularly the Core Content State Standards for Mathematics in New Jersey
- an introduction to state assessments for students in New Jersey such as the PARCC exam and assessments of student-teachers, including EdTPA and the Danielsen framework;
- an understanding of equity and access inside and outside of the mathematics classroom and modifications for various learners.

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.

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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

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.

Common Cores State Standards for Mathematics (CCSSM): http://www.corestandards.org/math

Course materials:
All readings will be available electronically **on our Canvas site.**

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Course meetings: Our course meetings will generally consist of three parts:
+ Discussion of readings: For most weeks, you will have a course reading to do on your own before the class starts. The readings will be available on the course Canvas site. The discussion of the reading will begin before the class. Every week, the reading will be discussed on the course Canvas site. A student will be assigned each week to lead the discussion, providing a summary of the reading, what instructional insights can be drawn from the reading, criticisms of the reading, and questions about the reading for their classmates. This summary should be posted by **Sunday at midnight** before the next class to give other students the opportunity to respond. Every other student is asked to respond to the discussion leader's summary by **Tuesday at midnight**, either by answering the discussion leader's questions or building on other points that the discussion leader made. You are encouraged to post more than once, including questions you may have for your classmates or instructor about the readings. These Canvas discussions are important for me as I will use them to organize the course discussion in Wednesday's class.

The readings will also be discussed during class. For the first 15 minutes of class, I will ask you to discuss issues in a breakout session of zoom. We will then spend 10 or so minutes discussing these issues as a whole class.

+ Mathematical explorations: For most weeks, you will work on an activity that helps you develop a deep understanding of a topic important to high school mathematics, such as variable, function, triangle congruence, and mathematical modeling. The activity will be based on a student-centered theme that we will expect you to use when you student-teach, such as employing technology, working with manipulatives, and using multiple representations. My aim is that you will learn how these teaching techniques can be effective based on your experience learning mathematics in these activities. After the activities, we will have a discussion of the mathematics that was learned and the pedagogical techniques that were employed. You will be given a short homework assignment to complete based on the themes discussed in the course.

+ Objectives, assessments, and state standards: For many weeks, we will spend time discussing what makes a good objective and a good assessment based on state standards. Many of the graded assignments in the course will be based on these activities.

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. If you must miss a class, you are responsible for contacting me (in advance if possible), getting the course materials, and making up for the class in order to receive the participation points. Please arrive for class on time.

Course readings (15 points): For most weeks, you will be assigned a course reading. Every week, the reading will be discussed on the course Canvas site. A student will be assigned each week to lead the discussion, providing a summary of the reading, what instructional insights can be drawn from the reading, criticisms of the reading, and questions about the reading for their classmates. This summary should be posted by **Sunday at midnight** before the next class to give other students the opportunity to respond. Every other student is asked to respond to the discussion leader's summary by **Tuesday at midnight**, either by answering the discussion leader's questions or building on other points that the discussion leader made.

Participation (15 points): Our class meetings will be divided between a lesson about pedagogy and a lesson about mathematical content. The lesson about pedagogy will concern teaching techniques, lesson plans, and standards, which will involve a group discussion led by me or a student-led discussion. The lesson about mathematical

content will involve you participating in activities to help you understand a core idea from high school mathematics at a deeper level. Both lessons will only work if you are actively involved, so your participation here is crucial.

Homework (10 points): Most weeks, you will be assigned a short homework assignment asking you to apply what you have learned mathematically to a topic in high school mathematics and/or to discuss a particular teaching method that was covered in this week's class.

Lesson plan (Group work assignment)
You will be placed into groups of three or four to develop a lesson plan. The purpose of this activity is to help you design instruction that teaches for conceptual understanding as well as to introduce you to the format and language used in a lesson plan. All lesson plans should be written in the Rutgers lesson plan format using EdTPA language—ideas that we will discuss in class.

Learning objectives (15 points): You will be asked to choose a topic, write a paper about what it would mean to understand that topic, and write learning objectives that are appropriate.

Assessment of learning (10 points): You will be asked to design formative and summative assessments to see if your learning objectives are being met.

Lesson plan (15 points): You will write up a lesson using the Rutgers lesson plan format in which you plan activities to achieve your learning goals

Implementation of your lesson and reflection (20 points): You will implement your lesson plan near the end of this semester. Your grade for the implementation will depend on your professionalism and preparedness. You are not expected to implement a perfect lesson this early in the program and you will not be penalized if things do not go so well, so long as you present a responsible effort. What is critical is that any weaknesses of your lesson are discussed in the reflection, along with a direction of how you can improve these weaknesses. Your reflection should be written using the EdTPA language.

Grading policy:

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.**

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

Class Date	Topic and Standards	Readings	Assignments
9/1	Introduction; Algebraic reasoning	None	
9/15	Elementary mathematics; Area model of multiplication; visual reasoning	Ma	
9/22	State standards; Variables and functions	Skemp, NJCCS	
9/29	Learning objectives; Multiple representations; Function transformations; Incorporating technology	Piez & Voxman; Danielsen	
10/6	EdTPA; Number theory and prime numbers; Using manipulatives	Thompson; EdTPA section 1	**Learning objectives assignment due**
10/13	Assessment; Exponents and logarithms; Guided discovery	Ilaria; PARCC	
10/20	Trigonometric functions	Moore	**Assessment assignment due**
10/27	EdTPA reflection; Mathematical modeling	Madiaon; EdTPA section 3	
11/3	Analysis of curricula	None	
11/10	Student lesson implementation; Inverse functions	Koedinger & Nathan	**Lesson plan assignment due**
11/17	Student lesson implementation; Differentiation	Schoenfeld	
11/29	Student lesson implementation; Integration; Using technology	Arvold	
12/1	Student lesson implementation; Integration	Jones	
12/8	Student lesson implementation; Discussions and reflections		**Lesson plan reflection due**

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