MAE 302: Advanced Methods of Teaching Secondary Mathematics

Derek Pope
Email: derek.pope@stonybrook.edu
Fall 2024, Tuesday 4:30 – 7:20
Physics Building, P130
Office hours: Tuesday 3:30-4:30 (Math 2-119), Thursday 3:00-5:00 (Zoom), and by appointment

This is a three-credit course in the theory and practice of teaching mathematics at the secondary level. We will learn about the philosophy and goals of mathematics education, with an emphasis on implementation: curriculum development; teaching techniques and styles; learning theories and styles; and lesson planning and assessment. Students will plan entire units of instruction, including lesson plans and assessments. Prerequisite courses: MAE 510/311.

Course Expectations and Grades:
Course grades will be tentatively determined by the following. The goal for each assignment is to help you learn and apply course material. You will also leave this class with lessons, unit plans, and other resources that you can use in your own future career. Grading rubrics will be provided to help you clearly understand expectations and properly assess your own work before submitting it. More specific details on due dates, expectations, and grading rubrics will be given during the semester. It is your responsibility to keep aware of due dates and submit everything electronically by the due date.

What?	How?	Why?
Active member of a community of learning (20%)	-Be present, on time, to each class; missing more than one class will result in a significant grade reduction. -Refrain from using technology in class, except for class-related purposes. -Actively engage in all class discussions, including your peers' presentations. -Complete all assigned readings and other homework assignments before class. -After each of your peers' lessons, complete the homework assignment they have created and give them constructive, critical feedback to help them improve their practice. -HW will be graded based on rubric below.	-Everyone benefits from each other's ideas, questions, and feedback during class discussion. -Inappropriate use of technology during class will distract you and your peers. -Homework assignments are chosen to facilitate practice and reflection, and readings are chosen so that your practice is grounded in research. -Through your peers' HW assignments, each of us will have a chance to create and assess authentic student work.
Lesson Planning and Teaching (25%)	-Once during the semester, you will plan and facilitate a lesson meant to develop your peers' conceptual understanding of an important (randomly assigned) mathematical concept from the secondary curriculum. -During your lesson, the instructor will engage in various challenging behaviors, which you will need to deal with while also assisting other students. -You will also create and give feedback on a homework assignment for your peers. -Based on class observations and homework results, you will reflect on how well your lesson impacted students' learning.	-The presenter will gain confidence in teaching a lesson, as well as practice planning a conceptually focused lesson, assessing student understanding, and managing a classroom. -Through the presentations and follow-up discussions, the class will review important math concepts and learn various pedagogical and classroom management strategies.
Classroom Management (10%)	-Complete a "journal" documenting the specific strategies and ideas you learned about effective classroom management practices.	-One of the most challenging aspects of teaching is managing the classroom effectively. This will give you a chance to

	-You will learn about these strategies during class discussion and will have access to other resources posted in the class Google Drive.	compile many strategies for preempting, and dealing with, problematic behaviors.
Unit planning portfolios (45%)	-Throughout the semester, you will complete a variety of assignments that will contribute to unit plan "portfolios." These assignments will include writing formal tests, creating alternative assessments, and sequencing units of instruction coherently. -Through these unit plans, you will demonstrate: familiarity with various pedagogical strategies; understanding of how to sequence and scaffold a unit of instruction; ability to differentiate instruction and foster equitable environments; and ability to create meaningful assessments of student understanding.	-This will be a chance to put together various elements of your understanding of mathematics, pedagogical techniques, and assessment techniques into two coherent units of study. -By completing two unit plans, you will gain familiarity with the wide range of concepts you are being certified to teach.

Homework rubric (for each assignment):

0	1	2	3
HW is missing or very incomplete.	Answers are incomplete, or there is limited evidence that the student is putting sufficient time or thought into the prompt.	Answers give evidence that the student is thinking about the prompts, but the answers lack critical reflection or deep thought.	Answers give evidence of thought and reflection. The considers alternative ideas or viewpoints, cites research, or presents examples from their own experience or observations.

Course grading thresholds are as follows. Actual final thresholds may be lowered if warranted, but achieving the lower bound of each of the following categories will guarantee that grade. Feedback and grades will be posted regularly to Google Classroom.

Grade	A	A-	B+	B	C+	C	D	F
Threshold	93-100	90-92	86-89	80-85	76-79	70-75	60-69	0-59

Tentative Schedule:

Week	Tuesday	Theme (tentative)	Teaching Practice	Big assignments due (tentative)
1	8/27	Opening activity; course overview	0 (me)	
2	9/3	Intro to unit planning: Big ideas, essential questions, standards		
3	9/10	Trig review; creating specific goals		
4	9/17	Writing quality math questions and tasks	1	
5	9/24	Writing a test	2	Unit plan 1.1
6	10/1	Analyzing tests and student work; classroom management	3	
7	10/8	Assessment for a growth mindset; grading	4	Unit plan 1.2A draft
		--break--		
8	10/22	Ordering lessons to form a cohesive unit plan	5	
9	10/29	Ordering lessons to form a cohesive unit plan	6	Unit plan 1.2A final
10	11/5	Ordering lessons to form a cohesive unit plan	7	
11	11/12	Issues around homework	8	Unit plan 1.3

12	11/19	Differentiating instruction & Creating alternative assessments	9	
13	11/26	Creating equitable classroom environments	10	Class Management Journal
14	12/3	Improving teaching and the teaching profession		Unit plan 1.4
FINAL	Tu 12/17	No in-person meeting; submit unit plan online before 6pm		Unit plan 2 (all assigned parts)

Required Resources:

- Stigler, J. W., & Hiebert, J. (2009). *The teaching gap: Best ideas from the world's teachers for improving education in the classroom*. Simon and Schuster.
- Boaler, J. (2016). *Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages and innovative teaching*. Jossey-Bass.
- Access to the NYS Next Generation Mathematics Standards
- Access to Desmos and GeoGebra (You may want to download the apps. A graphing calculator is also helpful.)

Contact: Please feel free to contact me anytime you have a question or concern or want to provide feedback to me. The easiest way to contact me is through email. Emails sent Monday-Thursday will be answered within 24 hours.

Generative AI: Teaching is a creative profession, and one of the things you will learn in this course is how to create engaging lessons for your students. You may choose to use generative AI tools like ChatGPT, along with various other internet and print resources, to help brainstorm lesson ideas. However, you may ***not*** use generative AI to create all or part of any assignment for this course. If you do use (with modification) ideas from a generative AI tool, you must acknowledge and properly cite its use. Any violation of this policy will be considered a breach of academic integrity and will be handled as such (see below).

Learning Standards:

- Candidates demonstrate a deep understanding of how students learn mathematics and of the pedagogical knowledge specific to mathematics teaching and learning.
- Students plan and present lessons that demonstrate understanding of the New York State Common Core Standards for Mathematics, including the Standards for Mathematical Practice.
- Teacher candidates summarize, analyze, and critique current research in mathematics education.
- Candidate makes explicit connections to research or theory in justifying instructional plans.
- Students recognize the INTASC critical dispositions and New York State Code of Ethics, they demonstrate critical dispositions and ethics in their interactions with students and colleagues.
- Teacher candidates work with others to create environments that support individual and collaborative learning, and that encourage positive social interaction, active engagement in learning, and self-motivation.
- Teacher candidates engage in ongoing professional learning and use evidence to continually evaluate his/her practice, particularly the effects of his/her choices and actions on others (learners, families, and other professionals in the learning community), and adapt practice to meet the needs of each learner.
- Teacher candidates seek appropriate leadership roles and opportunities to take responsibility for student learning, to collaborate with learners, families, colleagues, other school professionals, and community members to ensure learner growth and to advance the profession.
- Teacher candidates understand how children learn and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.
- Teacher candidates use understanding of individual differences and diverse cultures and communities to ensure inclusive learning environments that enable each learner to meet high standards.
- Teacher candidates understand the central concepts, tools of inquiry, and structures of the discipline and create learning experiences that make these aspects of the discipline accessible and meaningful for learners to assure mastery of the content.

- The teacher candidate 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.
- The teacher candidate understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher's and learner's decision making.
- The teacher candidate 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.
- The teacher candidate 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.

Learning Outcomes for "Speak Effectively before an Audience:"

1. Research a topic, develop an oral argument and organize supporting details.
2. Deliver a proficient and substantial oral presentation for the intended audience using appropriate media.
3. Evaluate oral presentations of others according to specific criteria.

Student Accessibility Support Center Statement: If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, 128 ECC Building, (631) 632-6748, or at sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the Student Accessibility Support Center. For procedures and information go to the following website and search Fire Safety and Evacuation and Disabilities.

Academic Integrity: Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website.

Critical Incident Management: Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.

Teacher Education Program Mandatory Professional License Disclosure

Note that this syllabus may be modified or supplemented if needed during the semester.