

HS Science Methods and Techniques Course Syllabus MEd 458 / TeachEd 358

Fall 2021 / Wednesdays 6:00-9:00pm

Instructor Information

Instructor

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Office Location

Annenberg 224
Office hours arranged by appointment.

Course Description

This course is designed to build your knowledge and skills at making science learning more meaningful for students in your science classroom. You will gain practical experience in the evaluation, design, and delivery of instruction that is aligned to the Next Generation Science Standards.

This course is based on current ideas and recent research about how students learn and teachers learn to teach science. The course design is informed a great deal by work that went into developing the Next Generation Science Standards. This course introduces teaching and learning strategies that aid students in becoming effective educators in the high school setting.

Goals

This course is designed to support 1. the understanding of what science teaching looks like in a high school classroom as laid out in the FRAMEWORK for K-12 Education and the Next Generation Science Standards 2. the preparation for professional teaching licensure.

You will have opportunities to practice and analyze student questions and ideas and learn how to engage students in scientific practices around big ideas in science. You will learn techniques to help foster meaningful learning experiences and dialog between each child you teach. You will also learn techniques to help you build and facilitate a dynamic and collaborative learning community in your science classroom, where students take ownership of the learning community.

Course Materials

Required Materials

A laptop or electronic device that can access the internet for each class.

Required Texts

A Framework for K-12 Science Education, National Research Council. 2012. ISBN: 978-0-309-21742-2 \$35.96 or you can download a PDF at no cost and print. You will need to bring a hard copy of this text to certain classes.

Next Generation Science Standards Appendix D - "All Standards, All Students": Making Next Generation Science Standards Accessible to All Students, National Research Council. 2013. Available [online](#) at no cost.

Course Schedule

This course schedule is provided as an overview of what the semester will entail. It was designed to compliment your Theory and Practice of Science Teaching course in order to build coherence between what you are learning in your methods course and what you will look for and try out in your field experience. It is possible that the timeline outlined in this syllabus may change in response to your needs as learners. Each week, I will provide you with an update about your assigned out of class assignments and readings. If you are unclear about what you are supposed to do, please reach out to me during or outside of class. My email and cell phone number are posted at the top of this syllabus. Course content is aligned with the Illinois Professional Teaching Standards (IPTTS), as well as Northwestern University's Guiding Commitments.

Week	Question to Investigate	Topics	Assignments due each week/ IPTS, NUCF & NSTA Standards
1	How do we support a classroom culture where all students experience meaningful science learning? How do we kick off investigations in an NGSS unit?	Shared vision for science learning Classroom norms Launch of HS unit in student hat	Home learning due: N/A IPTS: 1A-1C, 1F, 1L, 2A-2B, 4A, 4E, 9A, 9D, 5E-5G, 9H NSTA: 5b; SEL: 1B, 2A
2	What is the role of phenomena and questions in NGSS? Why do we need new science education standards?	Phenomena and questions in the science classroom History and Rationale for NGSS Anchoring phenomenon routine NGSS Structure	Home learning due: Model in Student Hat, additional PLC step instructions Readings: 1. Excerpt from the Teaching Gap on PLC, 2. NGSS Appendix D plus Case studies 1 and 2 3. Duckworth chapters with takeaways and questions IPTS: 2B, 2E, 2F, 2G, 3G NSTA: 1a, 3a, 3c
3	What does it look like when kids are engaged in science practices?	Students <i>figure out</i> rather than <i>learn about</i> science ideas Practices indicator lists Safety in the science lab	Home learning due: Vision for Meaningful Science Instruction Paper Readings: 1. Part I FRAMEWORK pages 1-37 2. Appendix D Case studies 3 and 4 with takeaways and questions IPTS: 2A-2C, 2F, 3D, 3G, 4E NSTA: 1b, 4a, 4b, 5c SEL: 3A
4	How do students figure out the science ideas?	Connected Investigations Navigation routine Q and A with guest teacher	Home learning due: Reading: Part II of the FRAMEWORK pages 41-82 and NGSS Appendix D Case studies 5, 6, and 7 with takeaways and questions IPTS: 1K, 2A-2G, 3F, 4G NSTA: 1b, 1c, 2a, 2b
5	What science ideas do kids figure out?	Unpacking Choose a lesson to implement Individual Check in	Home learning due: Reading: Chapter 4 of the FRAMEWORK pages 83-102 NGSS with takeaways and questions. IPTS: 2B, 2E, 2F, 2G, 3F, 3G NSTA: 1c, 3c, 5b, 6c
6	What role does productive talk play in NGSS classrooms? How do we meet the needs of all our students?	Talk moves introduction Classroom video analysis Equity in NGSS Discussion planning tool	Home learning due: Questions for admin submitted Reading: Talk Science Primer with takeaways and questions IPTS: 1B, 1E, 1I, 5E-5H, 6C NSTA: 2a, 2b, 3a
7	How do we revise our ideas?	Student reflection and video analysis STEM Teaching Tools Lesson-level performance expectations Q and A with HS principal	Home learning due: Video recording of NGSS lesson implementation. Look on PLC for assignment details. IPTS: 2B, 2C, 4A-4D, 4H, 9A, 9K, 9O NSTA: 3c, 6a, SEL: 2C
8	What does it look like when students are meeting a performance expectation?	Three-dimensional Assessment STEM Teaching Tools Analyze 3D assessment tasks	Home learning due: Unpacking documents for final lesson plan. Look on PLC for any other assignments. IPTS: 3F, 6H, 6K, 7A, 7B, 7E, 7F, 7G, 7I NSTA: 2d, 5a-5c

Week	Question to Investigate	Topics	Assignments due each week/ IPTS, NUCF & NSTA Standards
9	How do we build a three-dimensional lesson aligned to the NGSS?	Designing an NGSS lesson Peer-feedback on learning plans and products Individual Check in*	Home learning due: Finish individual lesson plan, Prepare for individual teaching presentation IPTS: 3A-3G, 5C-5F, 8B, 8D, 8E, 9N, 9O NSTA: 2a, 2b SEL: 1B, 3C
10	What does three-dimensional teaching look like?	Final Student Teaching Presentations Peer-feedback	Home learning due: All Finalized Teaching Documents IPTS: 3J, 3Q, 4A-4E, 5C, 5F, 5H, 7B, 7E, 7G, 9O, 9P NSTA: 3a, 3c, 5a, 5b, 6a. SEL: 1C
FINALS Week	What does three-dimensional teaching look like?	Final Student Teaching Presentations Day 2 Peer-feedback	Home learning due: All Finalized Teaching Documents, Final Reflection Paper part 1 and 2 IPTS: 3J, 3Q, 4A-4E, 5C, 5F, 5H, 7B, 7E, 7G, 9O, 9P NSTA: 2c, 3a, 3c, 5a, 5b, 6a. SEL: 1C

*Class may not meet this week to allow for individual student check ins and work time

Illinois Professional Teaching Standards (2013)

Standard 1 - Teaching Diverse Students

The competent teacher understands the diverse characteristics and abilities of each student and how individuals develop and learn within the context of their social, economic, cultural, linguistic, and academic experiences. The teacher uses these experiences to create instructional opportunities that maximize student learning.

Standard 2 - Content Area and Pedagogical Knowledge

The competent teacher has in-depth understanding of content area knowledge that includes central concepts, methods of inquiry, structures of the disciplines, and content area literacy. The teacher creates meaningful learning experiences for each student based upon interactions among content area and pedagogical knowledge, and evidence-based practice.

Standard 3 - Planning for Differentiated Instruction

The competent teacher plans and designs instruction based on content area knowledge, diverse student characteristics, student performance data, curriculum goals, and the community context. The teacher plans for ongoing student growth and achievement.

Standard 4 - Learning Environment

The competent teacher structures a safe and healthy learning environment that facilitates cultural and linguistic responsiveness, emotional well-being, self-efficacy, positive social interaction, mutual respect, active engagement, academic risk-taking, self-motivation, and personal goal-setting.

Standard 5 - Instructional Delivery

The competent teacher differentiates instruction by using a variety of strategies that support critical and creative thinking, problem-solving, and continuous growth and learning. This teacher understands that the classroom is a dynamic environment requiring ongoing modification of instruction to enhance learning for each student.

Standard 6 - Reading, Writing, and Oral Communication

The competent teacher has foundational knowledge of reading, writing, and oral communication within the content area and recognizes and addresses student reading, writing, and oral communication needs to facilitate the acquisition of content knowledge.

Standard 7 - Assessment

The competent teacher understands and uses appropriate formative and summative assessments for determining student needs, monitoring student progress, measuring student growth, and evaluating student outcomes. The teacher makes decisions driven by data about curricular and instructional effectiveness and adjusts practices to meet the needs of each student.

Standard 8 - Collaborative Relationships

The competent teacher builds and maintains collaborative relationships to foster cognitive, linguistic, physical, and social and emotional development. This teacher works as a team member with professional colleagues, student, parents or guardians, and community members.

Standard 9 - Professionalism, Leadership, and Advocacy

The competent teacher is an ethical and reflective practitioner who exhibits professionalism; provides leadership in the learning community; and advocates for students, parents or guardians, and the profession.

Northwestern Teacher Education Program Guiding Commitments

Northwestern University Teacher Education is committed to developing a community of educators--including aspiring teachers, faculty/staff, instructors, supervisors, mentor teachers, and teacher leaders-- of the highest caliber who see teaching as a scholarly, complex endeavor that requires an understanding of the intertwined nature of theory and practice. Our vision of transformative teaching and learning holds aspirations to develop educators who can nurture the learning of all of their students through valuing the multiple knowledges, identities and experiences that they bring with them to class and by utilizing learner-centered pedagogies.

Northwestern Teacher Education: Guiding Commitments for Developing Educators to Engage in Transformative Teaching and Learning



Course Expectations

Course Online Learning Platforms

This course uses the professional development system plc.nextgenstorylines.org (PLC). You have a username and account created in this system. Your username is your NU email address.

Assignments can be turned in by following instructions on the course Canvas site. Any modifications to assignments will be discussed and posted on PLC and/or Canvas. Please feel free to email me anytime if you have any questions.

Student Attendance Policy

Active attendance and participation in every class is expected. Your presence as part of a collaborative learning community is key to your development and the development of your colleagues. If for some reason you must be absent from a class session, you must inform me before your absence. Because of the short number of overall class sessions in the quarter system, missing two class sessions puts your ability to pass the class in jeopardy. Missing three class sessions will result in an automatic grade of "Incomplete" and you will have to retake the class at another time.

Readings

You are expected to complete the assigned readings for each class session, to complete written reflections about the readings when indicated and to engage in class discussions involving the readings.

Teaching Opportunity

You will implement a 40-minute lesson to a small group of "students". The lesson should incorporate the design principles learned so far throughout the course. You will videotape your lesson which will allow for personal and collaborative reflection.

In addition, we will have a 30-minute Question and Answer session with a high school principal. This is your chance to ask a school administrator anything you're thinking about! Questions will be submitted ahead of time to your instructor.

COVID-19 Classroom Expectations

Students, faculty, and staff must comply with University expectations regarding appropriate classroom behavior, including those outlined below and in the COVID-19 Code of Conduct. With respect to classroom procedures, this includes:

Policies regarding masking and social distancing evolve as the public health situation changes. Students are responsible for understanding and complying with current masking, testing, Symptom Tracking, and social distancing requirements.

- In some classes, masking and/or social distancing may be required as a result of an Americans with Disabilities Act (ADAaccommodation) for the instructor or a student in the class even when not generally required on campus. In such cases, the instructor will notify the class.
- No food is allowed inside classrooms. Drinks are permitted, but please keep your face covering on.
- Faculty may assign seats in some classes to help facilitate contact tracing in the event that a student tests positive for COVID-19. Students must sit in their assigned seats.

If a student fails to comply with the COVID-19 Code of Conduct or other University expectations related to COVID-19, the instructor may ask the student to leave the class. The instructor is asked to report the incident to the Office of Community Standards for additional follow-up. Maintaining the health of the community remains our priority. **If you are experiencing any symptoms of COVID do not attend class and update your Symptom Tracker application right away to connect with Northwestern's Case Management Team for guidance on next steps.** Also contact the instructor as soon as possible to arrange to complete coursework. Students who experience a personal emergency should contact the instructor as soon as possible to arrange to complete coursework. Should public health recommendations prevent in person class from being held on a given day, the instructor or the university will notify students.

Academic Integrity

MSED students are expected to comply with the policies found in the booklet, "Academic Integrity at Northwestern University: A Basic Guide". All papers submitted for credit in this course must be submitted electronically unless otherwise instructed by the professor. Students' written work may be electronically tested for plagiarized content using TurnItIn via Canvas. For details regarding academic integrity at Northwestern or to download the guide, visit: <http://www.northwestern.edu/provost/policies/academic-integrity/index.html>

Accessible NU

Northwestern University is committed to providing the most accessible learning environment as possible for students with disabilities in compliance with Section 504 of the 1973 Rehabilitation Act and the Americans with Disabilities Act. Should you anticipate or experience disability-related barriers in the academic setting, please contact AccessibleNU to move forward with the university's established accommodation process (accessiblenu@northwestern.edu; p: 847-467-5530). If you already have established accommodations with AccessibleNU, please let me know as soon as possible, preferably within the first two weeks of the term, so we can work together to implement your disability accommodations. Disability information, including academic accommodations, is confidential under the Family Educational Rights and Privacy Act.

Guidance on Class Recordings

This class or portions of this class may be recorded by the instructor for educational purposes and available to the class during the quarter. Your instructor will communicate how you can access the recordings. Portions of the course that contain images, questions or commentary/discussion by students will be edited out of any recordings that are saved beyond the current term.

Unauthorized student recording of classroom or other academic activities (including advising sessions or office hours) is prohibited. Unauthorized recording is unethical and may also be a violation of University policy and state law. Students requesting the use of assistive technology as an accommodation should contact [AccessibleNU](#). Unauthorized use of classroom recordings - including distributing or posting them - is also prohibited. Under the University's [Copyright Policy](#), faculty own the copyright to instructional materials - including those resources created specifically for the purposes of instruction, such as syllabi, lectures and lecture notes, and presentations. Students cannot copy, reproduce, display, or distribute these materials. Students who engage in unauthorized recording, unauthorized use of a recording, or unauthorized distribution of instructional materials will be referred to the appropriate University office for follow-up.

Grading

Participation, Attendance, and Reflections from Readings (25%)

Among a teacher's greatest tools are shared experiences, honest feedback from peers, and the opportunity to critique one's own practice. Willingness to participate fully is a must. You are expected to complete any assigned readings. Readings will be assigned by the end of each class and due the following class. After completing the reading, you should come to class ready to post and share at least one new discovery and one new question.

Written Assignments (25%)

There will be several written assignments assigned during the course. These include a vision for meaningful science instruction, unpacking, and discussion planning for the teaching opportunity.

Final Teaching Presentation and Lesson Plan (35%)

Each student will teach a 40-minute lesson to their peers that they designed. Each person will provide their peers with written feedback regarding the teaching presentations. The quality of written feedback to peers will be a part of the one's presentation grade. The lesson plan and all related supporting documents must be submitted prior to the start of the teaching presentation.

Final Individual Reflection (15%)

This final reflection will be in two parts. Part 1 will be a reflection based on your final teaching presentation using your peer feedback and formative assessment data you gathered during teaching. Part 2 will be a reflection about how your vision of science teaching has shifted throughout the course. You may choose to do these reflections as two written papers or video/oral voice presentations. More information will be given as we get closer to the end of the quarter.



All assignments need to be turned in by the requested deadline unless otherwise noted. No assignments will be accepted after the due date of the final individual reflection paper. If anyone is struggling to meet deadlines or submit assignments during the pandemic, please reach out to me directly to work out a plan together. Open and early communication is the best way to achieve a successful outcome.