

**Master of Science in Education Program**  
**MSEd 351/451 Topics: Science Content for Teachers**  
**Spring Term, Monday/6:00-9:00 PM, Kresege Hall 4410**

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Office Hours: Monday 4:15-6:00 PM and as needed by appointment



## Course Description

This course utilizes a discussion format with a heavy emphasis on critical thinking and skills based activities. The inquiry/discussion approach will help us delve into the concepts of ecology & earth systems found on the Illinois Licensure Test. Our approach will attempt to understand the content needed to support the NGSS found at the High School, Middle School & Elementary level.

## Course Objectives

1. Understand, use and apply modeling, computational and mathematical approaches to understanding populations, communities, and ecosystems.
2. Evaluate and discuss the effects of human impacts on health and the environment.
3. Design and carry out experiments & simulations that illustrate an understanding of human impacts on Ecosystems.
4. Use and develop models to understand the cycling of matter, materials and energy in Earth Systems.
5. Understand and analyze the types, characteristics, and distributions of Earth's renewable and nonrenewable resources and human impacts on these resources.
6. Evaluate the evidence regarding the origin of the Earth's geologic history, and the basic principles of plate tectonics.
7. Cite evidence that explains the changes seen on earth in terms of land formation & erosion.
8. Demonstrate knowledge of how the characteristics of water drive ocean currents and transfer energy and how patterns of water movement in the atmosphere determine local weather patterns.
9. Understand and describe the patterns and changes seen in the earth due to climate and weathering.
10. Apply knowledge of the cyclic patterns of motion of the sun, moon, planets, and stars in the sky.

11. Demonstrate knowledge of the origin of the solar system, the objects in the solar system (e.g., planets, comets, asteroids), and the force that controls their interactions.
12. Create lessons that are culturally responsive and include opportunities for service learning.

## Course Expectations, Policies, and Grading

Assignments will consist of readings, activities and a chance for you to create a project that will not only utilize the knowledge learned in the course but will prepare you to use in your classroom. Expect occasional formative assessments on the assigned readings. There will be one content exam midterm, a summative socratic seminar, Experimental Design and Data Analysis, CER's as well as a final project. I will use a rubric for grading your work and some formative assessments that you will receive ahead of time. Grades will be broken down by: 20% homework, **80% Exam, Socratic Seminar, NGSS Skill Development, (bolded work in syllabus).**

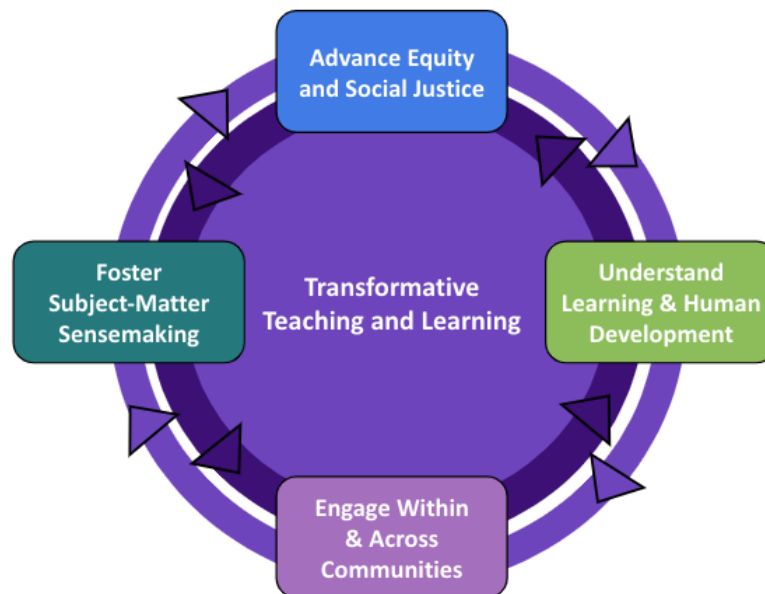
### Required Materials

1. "Earth: an Introduction to Physical Geology" 12th edition by Edward J. Tarbuck
2. Laptop

**Optional Text** (great for understanding how knowledge is built in these areas)

"A Brief History of Nearly Everything" by Bill Bryson

## Northwestern Teacher Education Guiding Commitments



The Northwestern Teacher Education Program's Guiding Commitments are:

- A statement of values about education for dignity, theories of learning as a social, cognitive, ethical and cultural process, and belief in the power of practices that create culturally sustaining & anti-racist learning environments

- Tools for strengthening our cultural life living through Course, “Discipline”, Program, and Community
- Opportunities to build knowledge, enact practices/ performances, cultivate dispositions

### Student Attendance Policy

“Student attendance at every class meeting 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 the instructor 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.”

### Academic Integrity Policy

“Students in this course are required 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. Your written work may be tested for plagiarized content. For details regarding academic integrity at Northwestern or to download the guide, visit: <https://www.northwestern.edu/provost/policies/academic-integrity/index.html>”

### Accommodations for Students with Disabilities

“Northwestern University is committed to providing the most accessible learning environment as possible for students with disabilities. 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 (e: [accessiblenu@northwestern.edu](mailto: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.”

### COVID-19 Testing Compliance

“To protect the health of our community, Northwestern University requires unvaccinated students who are in on-campus programs to be tested for COVID-19 twice per week.

Students who fail to comply with current or future COVID-19 testing protocols will be referred to the Office of Community standards to face disciplinary action, including escalation up to restriction from campus and suspension.”

### Prohibition of Recording of Class Sections by Students

“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.”

## Support for Wellness and Mental Health

I want you to know that your health and wellness is my primary focus. Please let me know if you need accommodations or an extended due date. The emphasis for this course is learning not grades, therefore feeling well and being well is our number one concern.

## 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 (ADA) accommodation 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 and use a straw.
- 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.”

## Exceptions to Class Modality (for hybrid or in-person sections)

“Class sessions for this course will occur in person. Individual students will not be granted permission to attend remotely except as the result of an Americans with Disabilities Act (ADA) accommodation as determined by AccessibleNU.”

“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.”

## Northwestern Teacher Education Working Professional Dispositions

At Northwestern University, we affirm that teaching is a scholarly, complex endeavor that requires an understanding of the intertwined nature of theory and practice. Teachers need to develop knowledge, skills, practices, and critical reflection, while they also actively and consistently demonstrate professional dispositions. We define dispositions as professional attitudes, stances, values and beliefs; we have collaboratively developed

our program dispositions for transformative teaching and learning. Through integrated coursework, developmental advising, and field experiences, we commit to supporting educators as they develop both their pedagogy and professional dispositions.

### **Commitment to Advancing Equity and Justice**

- Engage in self-reflection to understand your own identity, internalized biases, positional privileges, and your impact in any space.
- Demonstrate a recognition that teaching grounded in equity and social justice is essential in any setting and in the teaching of all subject matter.
- Work to understand how inequity shows up in different settings and take steps to disrupt those patterns.
- Identify and strive to address inequities and power relations of systemic racism, sexism, socioeconomic classism, heteronormativity, ableism, and other forms of human oppression.
- Cultivate interactions that demonstrably value all students and stakeholders and their ideas.

### **Sense of Professional Responsibility and Commitment to Ongoing Growth**

- Demonstrate self-awareness and self-management.
- Engage in self-reflection to understand your own identity, internalized biases, positional privileges, and your impact in any space.
- Demonstrate an openness to feedback and integrate feedback into action.
- Seek out resources, feedback, and support based on interests and/or needs.
- Engage in critical self-reflection and reflection on practice; explain rationale for decisions grounded in research, theory, and lived experience.
- Apply feedback and demonstrate a willingness to make changes.
- Take action to learn and meet the professional expectations for each context (this includes everything from professional records to attendance to attire).
- Meet all legal and ethical requirements (including related to how to appropriately engage with students, colleagues, and stakeholders).
- Engage in a way that is reliable and trustworthy (this includes being punctual, prepared, present, etc.).

### **Reverence for Learners and Learning**

- Demonstrate a commitment to all students as individuals with unique strengths and experiences; seek to understand and build relationships with all students.
- Maintain high expectations for all students; value and prioritize opportunities to advance learning.
- Recognize the complexity of teaching and learning.
- Demonstrate a strengths-based perspective and actively question and push back on deficit thinking.
- Value students' contributions and their diverse ways of knowing and being; commit to understanding students' thinking.

### **Focus on Collaboration**

- Seek to build meaningful relationships by understanding, working with, and learning from others.
- Value the contributions of families and community members and actively work to meaningfully connect with them.
- Seek to understand and build relationships with schools, families, and communities as particular types of intersecting systems within a larger ecosystem that shape our students' lives.
- Maintain a focus on recognizing students' strengths, advancing learning (own and others), and finding positive solutions during all interactions.

## Key Course Readings and Assignments

Class Date	Topic	Homework
March 29, 2022	<p>Introductions Circle Time: Creating Culture</p> <p>Population Ecology</p> <p>Mathematical Modeling in Population Ecology (<a href="#">Lab Design: Carrying Capacity</a>) &amp; Community Ecology (<a href="#">Patterns in Predation Activity</a> Analyzing graphs)</p>	<ol style="list-style-type: none"> <li>1. Read: <a href="#">Model Food Webs</a></li> <li>2. Case Study: Effects of Coyote Removal in Texas</li> <li>3. Reading 1. <a href="#">Plan B Chapter 1 Selling our Future</a> annotate the reading</li> </ol>
April 4, 2022	<p>Creating Service Learning Opportunities <a href="#">Community Ecology Competition and Exclusion Simulation</a></p> <p>Mathematical Modeling of Food Chains <a href="#">Biodiversity Simpsons Diversity Index Simulation</a></p> <p>Human Impacts Health and the Environment Socratic Seminar rubric Preparation-Trend Research and Questions</p>	<ol style="list-style-type: none"> <li>1. <a href="#">Reading Human-Environment Interactions in Population and Ecosystem Health-</a></li> <li>2. <a href="#">Global Footprint Network</a></li> <li>3. Finish Trend Research for Socratic Seminar Questions</li> </ol>
April 11, 2022	<p>Ecosystem Interactions discussion.</p> <p><a href="#">Algal Blooms-Experimental Design Intro Handout if needed</a></p> <p>Last minute Prep for Socratic Seminar</p> <p><b>Socratic Seminar Human Impacts on the Environment</b> <a href="#">Socratic Seminar Rubric and Self Reflection and Evaluation</a></p>	<p><a href="#">How to create a model Water Cycle Reading</a> Be ready to create a model of the water cycle from the reading</p> <p><b>Algal Blooms Experimental Design &amp; CER Due next week</b></p> <p><a href="#">Resources Reading</a></p>
April 18, 2022	<p><a href="#">Eutrophication Data study Student Sheet</a> only up to 2.1</p> <p><a href="#">Succession Inquiry</a> Cycling ppt/Create a model of the water cycle</p> <p>Carbon Cycle Model-create a description</p> <p>Discuss Nitrogen Cycle &amp; Phosphorus Cycle- Create a description <a href="#">Resources for Cycles</a> <a href="#">Limiting Nutrients Simulation</a> Each group assigned a different Lake</p>	<p><a href="#">Cycling Activity Review</a> Service Learning Ideas for Ecology phenomena Study for MidTerm</p>
April 25, 2022	<p>What does Culturally Responsive Teaching Look Like: Covid 19 data <a href="#">Interactive Map</a> Cycling of Materials &amp; Energy</p> <p><b>Mid-Term-Ecology</b></p>	<p><a href="#">Culturally Responsive Teaching Reading</a> Reflection on the Reading: What can you do in your classroom? <a href="#">Rock Cycle Review</a> Read Chapter 1 Textbook</p>

<p><b>May 2, 2022</b></p>	<p>Discuss Homework Culturally Responsive Ideas for the Classroom          Bozeman Videos and NGSS report out          Rock Cycle Intro to Geology  <a href="#">Geochemistry Earth's Geologic History and Plate Tectonics. The origins of mountains and volcanoes</a></p>	<p>Online Discussion with Classmates on Culturally Responsive Teaching</p> <p>Read Ch. 2, 5.9 &amp; 5.10 Textbook          Prep for CER as needed  <a href="#">Scientific American Article</a></p>
<p><b>May 9, 2022</b></p>	<p>Finish Mission Possible Convergent Boundaries  <b>Summative CER</b></p> <p><a href="#">Review the Science Principles</a>: What do those look like in the classroom. Group work.</p>	<p>Read Ch. 20 &amp; 21 Textbook  <a href="#">Bringing the Community into your classroom</a></p>
<p><b>May 16, 2022</b></p>	<p>Guest Geologist</p> <p>Characteristics of water driving ocean currents and developing weather patterns like El Nino, Hurricanes/Rubber Duckies</p>	<p>Read Ch. 6 Soil Formation</p> <p><a href="#">Ocean Currents Questions for Review</a></p>
<p><b>May 23, 2022</b></p>	<p>Erosion &amp; Weathering Text Set Analysis</p> <p><a href="#">Weathering Rates &amp; What's in My Soil??</a>  <b>Claims Evidence Reasoning</b></p> <p><a href="#">Solar System Data Analysis</a></p>	<p>Read Chapter 16 Textbook</p> <p><a href="#">Evolution of our Solar System</a></p> <p>Work on Lesson Design with science principles as the focus of delivering the content</p>
<p><b>June 6, 2022</b></p>	<p><a href="#">Solar System</a></p> <p>Present Lesson Plan</p>	<p>Can turn in your final lesson with revisions by Wednesday</p>