

# Mayville State University

## EDUC 326, Science Strategies for Elementary Teachers (31798)

Fall 2025  
3 Credit Hours

### Course and Instructor Information

**Instructor Name:** Darian Sherva

**Contact Information:**

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**Hours of Availability:** Available for meetings by appointment.

**Instructional Mode:** Online Asynchronous

**Course Dates:** August 25<sup>th</sup> -October 19<sup>th</sup>, 2025

**Time Zone:** All times indicated throughout this syllabus reflect Central Time (CT).

### Course Materials and Technologies

#### Required

Bass, J. E., Carin, A.A., Contant, T.L., Tweed, A. L., (2018). Teaching science through inquiry based-instruction, Thirteenth Edition. Hudson Street, NY, NY: Pearson ISBN: 9780134515472

National Research Council (2012), A framework for k-12 science education practices, crosscutting concepts, and core Ideas. Committee on a Conceptual Framework for New K-12 Science Education Standards. Board of Science Education, Division of Behavioral and Social Science and Education. Washington, DC: The National Academies Press ISBN: 9780309217422

\*\*No or low-cost option: May download the National Research Council framework text or read online:

[Free Download for the National Research Council Framework for K-12 Science Education Practices](#)

#### Articles

Throughout the course, you will have articles assigned as required reading. These articles can be accessed through ODIN. If you need assistance locating these articles, please contact the library.

### Use of Artificial Intelligence in this Course

AI tools can serve as collaborative partners in your learning journey. In this course, you are permitted to use them for brainstorming, generating outlines, or exploring alternative perspectives. As with any source, you must critically evaluate the information provided and verify its accuracy. When AI has contributed to your work, include a citation specifying the tool used and its role in your process (e.g. 'Initial concept exploration assisted by CoPilot').

### Course Description

This methods course is designed to prepare elementary teacher candidates to work with the seven crosscutting concepts essential to sciences and engineering. The inquiry process will be used in the study of physical, life, earth and space sciences and engineering to build competencies in science and technological literacies. Teacher candidates will explore the personal and social perspectives that unify global connections in science

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and STEM careers. It is recommended that teacher candidates take courses that include life, physical, earth and space sciences prior to this course.

**Prerequisites:** [EDUC 250](#)

## Course Objectives

#	Course Objective	InTASC	NDEC	ND ELED
1	Analyze instructional strategies used in K-8 science classrooms	7l, 8h, 8o		3c, 4e
2	Model effective science instructional strategies for the K-8 science classroom	4j, 7h, 7k, 8a, 8d, 8e, 8j, 8n, 8s	5a, 5c	1b, 3c
3	Use the three dimensions of content, practices, and crosscutting concepts to optimize K-8 student learning experiences	4d, 4r, 5i, 5j, 7a, 7c, 7g, 7k	5a, 5c	2b, 4e
4	Explain the essential elements of scientific and engineering practices	4b, 4c, 4p	5c	4c
5	Engage in scientific inquiry and engineering design	4c, 5a, 7b, 7h, 7m, 7n, SLO		4c, 4d, 4e
6	Create a classroom management plan to address student safety in an active learning environment	3a, 3d, 3e, 3i, 3n, 3p		1a, 3e, 3f, 4a, 4e, 4f
7	Demonstrate a comprehensive understanding of science content in Engineering and Technology, Earth and Space, Life, and Physical Sciences	4b, 4h, 4j, 4l, 5i	5a, 5c	2b, 4e
8	Create inquiry-based science lessons	3d, 3i, 5a, 5o, 8c, 9d		3c
9	Develop a growth mindset for science education	3f, 3r, 4j, 4o, 7c, 7n, 9d		1b, 5c

## Program Learning Outcomes (SLOs) Addressed in this Course

As part of Mayville State's effort to demonstrate continuous improvement in achieving student learning outcomes, this course will address the following SLOs. The Academic Program Student Learning Outcomes document can be found in your course shell. It contains all learning outcomes pertaining to Essential Studies courses and all majors and minors. The document has an index, so you can quickly find the degree you are pursuing. As part of Mayville State's effort to demonstrate Mayville State University - January 13, 2020, continuous improvement in achieving student learning outcomes, this course introduces and reinforces the following SLOs:

- **SLO 1: The Learner and Learning:** Teacher candidates understand diversity in learning and developmental processes and create supportive and safe learning environments for students to thrive.
- **SLO 2: Content:** Teacher candidates understand the subject matter deeply and flexibly so they can advance their students' learning, address misconceptions, and connect ideas to everyday life.
- **SLO 3: Instructional Practice:** Teacher candidates will plan instruction, utilize effective instructional strategies and technologies, and continuously assess students for mastery and decision-making purposes.
- **SLO 4: Professional Responsibility:** Teacher candidates take responsibility for student learning positive relationships, their own professional growth, and the advancement of the profession.

As part of Mayville State's effort to demonstrate continuous improvement in achieving student learning outcomes, this course:

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SLOs/Professional Standards	Mastery Assignment
SLO 1: The Learner and Learning	
SLO2: Content	Cumulative Review
SLO3: Instructional Practice	Science Fair Final Project
SLO 4: Professional Responsibility	

## InTASC Standards

1	The teacher understands how learners grow 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.
2	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
3	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.
4	The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make these aspects of the discipline accessible and meaningful for learners to assure mastery of the content.
5	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.
6	The teacher 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..
7	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..
8	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.
9	The teacher engages in ongoing professional learning and uses evidence to continually evaluate his/her practice, particularly the effects of his/her choices and actions on others (learners, families, other professionals, and the community), and adapts practice to meet the needs of each learner.
10	The teacher seeks 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.

Table created from InTASC standards retrieved from: [InTASC Model Core Teaching Standards and Learning Progressions for Teachers](#)

## Additional Standards

- [CEC Standards](#)
- [Knowledge and Practice Standards for Teachers of Reading](#)
- [North Dakota Reading Standards](#)
- [North Dakota Early Childhood Standards](#)
- [North Dakota Reading Standards](#)
- [NAEYC Program Standards](#)

## Conceptual Framework

Teacher Education courses are based upon the Conceptual Framework: Reflective Experiential Teacher. Our conceptual framework at Mayville State is *The Reflective Experiential Teacher* and is located in the Teacher Education Handbook. It is based upon a belief that pre-service teachers develop abilities to reflect on current research findings, essential and theoretical knowledge, and appropriate teaching strategies and practices through experience. The application requires learning how to reflect, question, and test hypotheses, while

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experiential practices engage students in a variety of clinical, field-based opportunities in which to employ and assess their instructional abilities.

## Course Expectations

Active participation throughout all learning experiences demonstrates your interest, engagement, and dedication to the teaching profession. Your willingness to interact positively with peers and the instructor reflects well of your professional disposition. Below you will find guidelines to help create successful learning experiences:

- **Instructor/Student Communication:** Students are accountable for all academic communications sent to their Mayville State University email address. Please email me at [darian.sherva@mayvillestate.edu](mailto:darian.sherva@mayvillestate.edu) with questions or to schedule meetings. I typically respond within 24-48 hours on weekdays.
- **Review ALL weekly materials and be prepared.** Active participation is expected. Please notify me via email of any questions, wonderings, or celebrations. It is expected that each week assignments will be completed to the best of your ability. As a pre-service teacher, your preparation demonstrates dedication to the profession.
- **Be flexible, take risks, and ask questions!** Teaching at any level requires flexibility and responsiveness to student needs. The same is expected of you in this course.
- **Adhere to the code of student conduct** found in the MSU Student Handbook. This includes academic honesty—properly cite and reference others' work, including the use of artificial intelligence. When in doubt, give credit and cite. Contact me with any academic honesty questions.

## Evaluation and Grading

Evaluation in this course will consist of both formative and summative assessments. Numeric and written feedback will be provided by the instructor through the Blackboard gradebook. Assignment feedback is typically given within 1 week of the assignment due date (2 weeks for larger assignments). All feedback is provided via Blackboard. It is the learner's responsibility to meet assignment deadline dates as outlined in the syllabus. Adhering to deadlines demonstrates the learner's ability to display disposition required for the teaching profession. This course adheres to the following grading scale:

100-94%=A    93-87%=B    86-80% = C    79-70% = D    69-0% = F

To successfully complete this course, your attendance and active participation is required and reflects positively on your disposition as an educator. Participation in assignments, group activities, and class discussions add to the quality of your learning experience. Assignments not submitted by the due date and time will earn a zero in the Blackboard gradebook. Teacher candidate may submit missing assignments up to the last day of class in Week 8 and must notify the instructor via email that assignments have been submitted. One point will be deducted for each day the assignment is late. **If you know you will be gone or an assignment will be late, notify the instructor before the date of class and/or the assignment is due.** There will be no extra credit offered for this course. Starfish will be used to report unsuccessful submissions of course assignments and kudos to those who are meeting and exceeding expectations. Please pay attention to those updates.

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## Breakdown of Grades

Activity	No. of Occurrences	Points Possible	Week
Online Verification Syllabus Discussion Board	1	5	#1
Next Gen. Science Standards Scavenger Hunt-Assignment	1	10	#1
Science Journal check-in	1	10	#1
Analyze elements of an Inquiry-Based Lesson/Science Journal check-in	1	10	#2
Activity: 5E Model Bean Lesson Plan & Bean Life Cycle Challenge (Life Science) Assignment	1	10	#2
Observing, Measuring, and Classifying Activities Assignment	1	10	#2
STEM Activity: Beanie Baby Index Card Tower Challenge Discussion Board	1	10	#3
Inquiry-Based 5E Model Science Lesson Video Demonstration Assignment	1	50	#3
Activity 23: Shadow Exploration p. A-75 (Physical Science) Assignment	1	30	#3
Animal Photos/Stories Cross-Cut Content Activity	1	10	#4
Science Fair Final Project Assignment	1	100	#4, #7
STEM Activity: Parachute Challenge Assignment (Also answer questions in the Discussion Board area.)	20	20	#5
ND Fish and Wildlife Implementation Assignment	1	20	#5
Science App Video Tour Assignment	1	10	#6
Science of Education Philosophy Assignment	1	20	#7
Ongoing Science Journal/Notebook Assignment	1	50	#8
Cumulative Review	1	55	#8
Discussion Board: Science Fair Peer Feedback	1	10	#8
Total Points Possible		440	

## Enrollment Verification

The U.S. Department of Education requires instructors of online courses to provide an activity which will validate student enrollment in this course. The only way to verify that a student has been in this course is if he, she, or they perform an action in the LMS, such as completing an assignment or taking a quiz. Logging into the LMS is **NOT** considered active course participation. Please complete the designated enrollment verification activity by the date indicated. If it is not complete your enrollment in this course will be at risk.

## Proctor Notification

This course will use an asynchronous proctoring solution called YuJa Verity for the Final Exam.

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## Important Student Information

In the Help & Resources for Students section of the Blackboard Institution Page, you can view and download the Important Student Information document for the current academic year. It includes information about:

- ✓ Land Acknowledgement Statement
- ✓ Academic Grievance Concerns and Instructor English Proficiency
- ✓ NetTutor - Online Tutoring Program
- ✓ Starfish - Student Success System
- ✓ Students with Documented Disabilities
- ✓ Student Learning Outcomes / Essential Learning Outcomes
- ✓ Academic Honesty
- ✓ Emergency Notification
- ✓ Continuity of Academic Instruction for a Pandemic or Emergency
- ✓ Family Educational Rights and Privacy Act of 1974 (FERPA)
- ✓ Diversity Statement (Title IX)

## Course Timeline/Schedule

**Weekly Assignments are due each Sunday evening by 11:59 P.M. unless specified otherwise. Other, more significant, assignments** have due dates listed, allowing for two weeks or more to complete. Due dates for all assignments and activities are specified in Blackboard.

Students will use the various interactive technologies to present their individual or group-created participatory course concepts on a weekly basis as assigned. EDUC 326 is a methods course, and students will gain teaching skills and knowledge throughout the course. Some content may be recorded for student learning purposes in this class.

Week	Dates	Topic(s)	Assignment(s) Due Sundays by 11:59 P.M. unless otherwise noted in Bb.
#1	8/25	-Syllabus and Course Overview -Online Verification Activity -K-12 Science Framework, Next Generation Science Standards; ND (or your home state standards); <a href="#">National Science Teacher Association Website</a> <b>--Teaching Science Text: Chapters 1, 5, 8, and 9</b> 1. Inquiry-based Instruction and the 5E Model (Leaf Activity) 2. Connecting Science to Other Content Areas (ELA Connections)	-Syllabus Online Verification Activity -Module 1 Science Journal Responses -NGSS Scavenger Hunt  <b>Due 8/31 by 11:59 P.M.</b>
#2	9/01	<b>--Teaching Science Text: Chapters 5 and 9</b> 1. Inquiry-based Instruction and the 5E Model (Seeds/Bean Activity) 2. Connecting Science to Other Content Areas (ELA Connections) 3. Practice Writing up a 5E Model Lesson	-5E Model Bean Lesson Plan and Challenge -Analyzing the Inquiry-Based Model -Activities: Observing, Measuring, and Classifying

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		<p><b>--Teaching Science Text: Chapters 2</b></p> <ol style="list-style-type: none"> <li>1. Getting Ready for Inquiry</li> <li>2. Inquiry-based Instruction               <ul style="list-style-type: none"> <li>*Engineering Design Model</li> <li>*5 E Model Lesson</li> <li>*Scientific Method</li> </ul> </li> </ol> <p>(This week, you will begin to develop your topic to develop a 5E Model lesson that you will deliver to a student or students. This will be a recorded demonstration assignment.)</p>	<p><b>Due 9/07 by 11:59 P.M.</b></p>
#3	9/08	<p><b>--Teaching Science Text: Chapter 7</b></p> <ol style="list-style-type: none"> <li>1. Assessing Science Learning”</li> <li>2. Science Investigations: Observing, Classifying, and Exploring</li> <li>3. Developing a 5E Lesson</li> </ol> <p><b>--Teaching Science Text: Chapters 4 &amp; 6</b></p> <ol style="list-style-type: none"> <li>1. Learning Science with Understanding</li> <li>2. Effective Questioning               <ul style="list-style-type: none"> <li>*Types of Questions</li> <li>*Alignment of Questions to:                   <ul style="list-style-type: none"> <li>-Standards</li> <li>-5E Inquiry Model</li> </ul> </li> </ul> </li> <li>3. Merging the 5E Model into Inquiry-based Instruction               <ul style="list-style-type: none"> <li>*Essential Features</li> <li>*Levels of Inquiry</li> </ul> </li> </ol>	<p>-Beanie Baby STEM Challenge 5E Model Inquiry-Based Science Lesson -Science Journal Responses -Physical Science: Shadow Exploration</p> <p><b>Due 9/14 by 11:59 P.M.</b></p>
#4	9/15	<p><b>--Teaching Science Text: Chapter 3</b></p> <ul style="list-style-type: none"> <li>*Creating a Positive Classroom Environment</li> <li>*Extended Shadow Exploration</li> </ul> <p><b>--Teaching Science Text: Chapter 10</b></p> <ol style="list-style-type: none"> <li>1. Equity, Diversity, Achievement Gaps</li> <li>2. Helping Students from Linguistically and Culturally Diverse Backgrounds</li> <li>3. Inclusive Science Classroom               <ul style="list-style-type: none"> <li>*Specific Learning Disabilities</li> <li>*Intellectual Disabilities</li> <li>*Emotional Disabilities</li> <li>*Other Health Impairments</li> </ul> </li> <li>4. Create a Mind Map to show accessibility considerations and ideas</li> <li>5. Implementing Accessibility into your Science Fair Final Project</li> <li>6. Science Fair Project Overview:               <ul style="list-style-type: none"> <li>*Merging a Science Fair Project with the Design Process, the 5E Model, and the Scientific Method</li> </ul> </li> </ol>	<p>-Introduction to Science Fair Final Project: Science Fair Problem Statement -Animal Photos/Stories</p> <p><b>Due 9/21 by 11:59 P.M.</b></p>
#5	9/22	<ol style="list-style-type: none"> <li>1. STEM and the Design Process               <ul style="list-style-type: none"> <li>*STEM Parachute Activity</li> </ul> </li> </ol>	<p>-ND Fish/Wildlife Presentation and responses</p>

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		<p>2. STEM to STEAM Activities (What is the difference?)</p> <p>3. Habitats of ND Fish and Wildlife Presentation: Sherri Niesar</p>	<p>-Parachute STEM Activity</p> <p>-Parachute Inquiry Question for Discussion Board</p> <p>-Bean Seed Progress</p> <p><b>Due 9/28 by 11:59 P.M.</b></p>
#6	9/29	<p><b>--Teaching Science Text: Chapter 8</b></p> <p>1. Technology Tools and Resources</p> <ul style="list-style-type: none"> <li>*Gathering Scientific Information</li> <li>*Data Collection/Analysis</li> <li>*Creating and Using Models</li> <li>*Communication</li> <li>*Using Social Media</li> </ul> <p>2. Explore websites and apps that help students learn about the following areas from our text: Physical Sciences, Life Sciences, Earth and Space Sciences, Engineering, Technology, and Applications of Science Activities</p> <p>3. Final Project:</p> <ul style="list-style-type: none"> <li>*Ask Science Fair Questions and for Feedback before creating your presentation.</li> <li>*Review for Final Exam: Send the instructor any questions you may have.</li> </ul>	<p>-Discussion Board: Science Technology Apps and Games Exploration Video Tours</p> <p><b>Due 10/05 by 11:59 P.M.</b></p>
#7	10/6	<p>1. Philosophy of Science Education</p> <p>2. Science Fair Presentation Videos are due at the end of this week.</p>	<p><b>-Science of Education Philosophy</b></p> <p><b>-Submit your final Science Fair Presentation Videos</b></p> <p><b>Due 10/12 by 11:59 P.M.</b></p>
#8	10/13	<p>1. Science Fair Presentations Feedback and Evaluations</p> <p>2. Completion of Final Review</p>	<p><b>-Discussion Board: Feedback for Peer presentations</b></p> <p><b>-Cumulative Review</b></p> <p>-Submit Final Ongoing Sicen Journal Questions/ Responses/Summary as indicated in the dropbox.</p> <p><b>Due 10/19 by 11:59 P.M.</b></p>



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## References / Bibliography

- Bass, J. E., Carin, A.A., Contant, T.L., Tweed, A. L. (2018). Teaching science through inquiry-based-instruction, Thirteenth Edition. Hudson Street, NY, NY: Pearson ISBN: 9780134515472
- Castek, J. & Beach, R. (2013). Using apps to support disciplinary literacy and science learning. *Journal of Adolescent and Adult Literacy*, 56(7), 554-564. <https://doi-org.odinproxy04.odin.nodak.edu/10.1002/JAAL.180>
- National Research Council (2012), A framework for K-12 science education practices, crosscutting concepts, and core Ideas. Committee on a Conceptual Framework for New K-12 Science Education Standards. Board of Science Education, Division of Behavioral and Social Science and Education. Washington, DC: The National Academies Press ISBN: 9780309217422
- Sample philosophy of education*. (n.d.). University of Arizona Global Campus Writing Center. <https://content.bridgepointeducation.com/curriculum/file/a8a84b6b-aa7e-488c-84b8-24bf0aefb0ae/1/Sample%20Philosophy%20of%20Education.pdf>
- University of Arizona Global Campus. (n.d.). *Writing a philosophy of education*. Writing Center. <https://writingcenter.uagc.edu/writing-philosophy-education>