EDUC 4053 Teaching Science in Elementary School

COURSE SYLLABUS: Spring 2021

INSTRUCTOR INFORMATION

Instructor: **Dr. Timothy Hinchman**
Physical Office Location: **330 Bridwell Hall**
Virtual Office: **Available through Zoom**
Office Hours: Tuesday and Thursday 8am-10:30am (others available by appointment)
University Email Address: timothy.hinchman@msutexas.edu
Preferred Form of Communication**:** Email
Communication Response Time: Within 24 hours Monday- Friday, Within 48 hours on the weekend.

Course Description

This field-based course focuses on elementary school science pedagogy with emphasis on instructional strategies and models, the use of technology in the learning/teaching process, effective practices, professionalism, curriculum, and lesson design. Different teaching strategies include: appropriate use of creative approaches to the learning/teaching process, cooperative learning, direct instruction, inquiry, concept attainment, etc. An important component of this field-based block of classes is the course time spent in active participation in field (classroom) experiences.

Textbook(s)

One of the following textbooks is recommended:

- Contant, T. L., Tweed, A. L., Bass, J. E., & Carin, A. A. (2018). *Teaching science through inquiry based instruction*. New York: Pearson.
- Peters, J. M., & Stout, D. L. (2011). *Science in elementary education: Methods, concepts, and inquiries*. Boston: Pearson Education.

Competency List

This course will build mastery of the following competencies:

The *syllabus/schedule are subject to change.*

1. The science teacher manages classroom, field and laboratory activities to ensure the safety of all students and the ethical care and treatment of organisms and specimens.

2. The science teacher understands the correct use of tools, materials, equipment and technologies.

3. The science teacher understands the process of scientific inquiry and its role in science instruction.

4. The science teacher has theoretical and practical knowledge about teaching science and about how students learn science.

5. The science teacher knows the varied and appropriate assessments and assessment practices to monitor science learning.

6. The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in physical science.

7. The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in life science.

8. The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in Earth and Space science.

Student Competencies

Upon completion of this course, the student will be able to:

- understand that science involves observing, analyzing, and investigating the natural world.
- explain how science educational initiatives emphasize student-centered inquiry and conceptual understanding.
- identify the basic structure of inquiry-based practices.
- select the science concepts, procedures, and skills that they will use during inquiry-based instruction.
- determine the best model for conducting inquiry-based instruction.
- create a positive classroom environment where learning is rigorous, yet engaging, trust is evident and everyone believes that they can learn.
- understand that a positive classroom environment is essential in promoting active inquiry-based learning.
- lead their class to a deeper understanding of science concepts using various approaches.
- change their classroom alternative conceptions and misconceptions of science concepts through various instructional practices.
- learn about Science Classroom Safety, the law, and how it applies to the science teacher.
- develop formative assessment processes that will be used as a feedback loop to help learning move forward.
- develop summative assessments that will provide evidence of student knowledge and understanding at the learning cycle's end.
- develop authentic assessments which are designed to measure understanding of several learning targets.
- apply key concepts of physical, earth/space, and life sciences to develop lessons using strategies and methods that increase understanding through authentic learning experiences.
- utilize digital tools, resources, and strategies to enhance their teaching effectiveness.
- create a learning experience that facilitates creative and critical thinking skills across the curriculum.

COURSE REQUIREMENTS

Minimal Technical Skills Needed

Must be able to use Microsoft and Google Suites.

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Instructional Methods

This is a hybrid-flex course. Learning activities include assorted activities, lectures, readings, videos, written assignments, and key assessments.

Student Responsibilities or Tips for Success in the Course

To be successful in this course, plan to spend at least **120** hours to read/listen/watch online content, complete assignments, and study the course material.

GRADING

Final grades in this course will be based on the following scale:

A = 861-1000 points
B = 751-860 points
C = 661-750 points
D = 401-660 points
F = 400 points or Below

Competency Assessments

Written Assignments

Each module will have a written assignment that will assess your ability to synthesize and apply the module's learning goal.

The module written assignment is an assessment of your knowledge of the material required for the competency. A rubric score of 70% or higher is required to demonstrate mastery of each learning goal.

Performance-Based Key Assessment – *Inquiry-Based Instruction, Unwrapping TEKs, and 5E Lesson Plan*

The performance assessment for this course is a portfolio consisting of the foundations in inquiry-based instruction. Students will research, identify, and model instructional practices that are promote inquiry-based instruction in a mainstream science classroom setting

All grade levels are examined within the TEKs to determine what knowledge, skills, and abilities are addressed at the different grade levels. Students are to determine how the standards are connected.

Students will identify the basic structure of inquiry-based practices. They will explore the National Science Education Standards Overview followed by the Biological Sciences Curriculum Study (BSCS) 5E Instructional Model.

Students will then dive deeper into inquiry-based instructional practices. They will explore research based using inquiry-based instructional practices. They will examine teachers using inquiry-based practices and read research regarding this practice.

Students will explore the TEK or TEKs you will be teaching in your observation. They will first identify the key verbs (skills) and nouns (concepts) contained within the assigned TEK. They will use a graphic organizer to reorganize the concepts and the skills. They will examine the list of identified skills, and discuss the level of thinking associated with each using Blooms taxonomy. They will identify the big idea in the TEK, any essential questions that serve as the instructional focus, and use this information to write the following 5E Lesson Plan.

Students will write an inquiry-based science lesson plan using the 5E instructional delivery. The TEK should be assigned by their mentor teacher and they will work with their university supervisor to write an engaging lesson plan for the assigned field class.

The final project is an assessment on your ability to synthesize and apply the concepts learned in the modules. A score of 80% or higher is required to demonstrate competency on each section of the final project.

TECHNOLOGY REQUIREMENTS

LMS

All course sections offered by MSU have a corresponding course shell in the D2L Online Learning Management System (LMS). Below are technical requirements and associated system check.

D2L Technical Requirements

ACCESS AND NAVIGATION

You will need your user name and password to log into the course. If you do not know your user name or have forgotten your password, contact helpdesk@mwsu.edu. For more information on the MSU's IT services, see Information Technology.

COMMUNICATION AND SUPPORT

If you have any questions or are having difficulties with the course material, please contact Dr. Hinchman.

Technical Support

If you are new to D2L or if you are having technical difficulty with any part of D2L, please contact Distance Education. Other support options can be found here:

https://community.brightspace.com/support/s/contactsupport

Interaction with Instructor Statement

Expect responses to email within **24** hours and feedback on your final project within **48** hours.

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COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures/Policies

In order to demonstrate competency, you must achieve 70% or higher on each required competency/module.

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

Late Work

Because all assignments are available and submitted online, "make up" work should not be an issue. Late work will not be accepted unless a written medical or equally extenuating circumstance is provided. The D2L Dropbox will close at 11:59pm on the due date.

Attendance

WCOE Face to Face Policy: Professionals are dependable, reliable, and responsible. Therefore, candidates are expected to be on time and in attendance at every class, and to stay for the entire class. Tardiness, leaving early, and excessive absences (3) are considered evidence of lack of dependability, and are taken seriously. Candidates will receive a grade of F on the third absence. If a candidate is taking 'blocked' courses that are taught at a Professional Development School, requiring field experience, the candidate will be dropped with an F from those classes as well. Attendance and class activity participation grades will be recorded in the Dispositions category.

University Specific Procedures

Student Conduct

Students are expected to uphold and abide by certain standards of conduct that form the basis of the Student Code of Conduct. These standards are embodied within a set of core values that include integrity, social justice, respect, community, and responsibility. When members of the MSU community fail to exemplify these values, campus conduct proceedings are used to assert and uphold the Student Code of Conduct. The Code of Student Conduct is described in detail in the Student Handbook.

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum: https://www.britannica.com/topic/netiquette

Electronic Network Access

Students using the university network facilities and services will indemnify and hold harmless the university against any and all actions or claims of infringement of intellectual property rights arising from the use of a network-based service or facility provided by the university. Network access is provided by password control. All passwords are managed and controlled by Information Systems. See Student Handbook for specific policies on electronic network access.

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Academic Dishonesty

Students at MSU are expected to maintain high standards of integrity and honesty in their scholastic work. For more details and the definition of academic dishonesty see the Student Handbook.

Students with Disabilities-- ADA Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. It is the policy of Midwestern State University that no otherwise qualified person, on the basis of disability, be excluded from participation in, be denied the befits of, or be subject to discrimination under any education program, activity, or employment of the university. If you have a disability requiring an accommodation, please contact:
Office of Student Disability Resources and Services

Nondiscrimination Notice

MSU will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

Campus Concealed Carry Statement

MSU is committed to providing a safe and secure learning, working, and living environment for students, faculty, staff, and visitors, and to respecting the right of individuals who are licensed to carry a handgun where permitted by law. Individuals who are licensed to carry may do so on MSU's campus premises except in locations and at activities that are prohibited. The carrying of any handgun by an unlicensed person or the open carry of a handgun is not permitted in any place on MSU's campus premises. For more information on Carrying Concealed Handguns, see the Student Handbook.

COURSE OUTLINE (below)

COURSE OUTLINE/CALENDAR		
Module Topic	**Assignments**	**Due Date**
M1 – The Nature of Science and Science Education	**Module 1: Nature of Science and Science Education Writing Assignment #1**	**Saturday 08/28/2021 @ 11:30pm**

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M2 – TEK Alignment and Content Knowledge	**Module 2 Assignment #1: Science TEKS Introduction Statement Graphic Organizer** **Module 2 Assignment #2: TEKs T-Chart (draft)** **Module 2 Assignment #2: TEKs T-Chart (final)**	**Thursday 09/02/2021 @ 11:30pm** **Thursday 09/02/2021 @ 11:30pm** **Saturday 09/04/2021 @ 11:30pm**
M3 –Constructivism and Science Teaching	**Module 3: Constructivism and Science Teaching Writing Assignment #1**	**Saturday 09/11/2021 @ 11:30pm**
M4–Inquiry Based Instruction Foundations	**Module 4: Inquiry Based Instruction Foundations Writing Assignment #1**	**Saturday 09/18/2021 @ 11:30pm**
M5 – Creating an Inquiry-Based Classroom Environment	**Module 5: Creating an Inquiry-Based Classroom Environment Writing Assignment #1**	**Saturday 09/25/2021 @ 11:30pm**
M6- Assessment in the Science Classroom	**Module 6 Writing Assignment-Assessment in the Science Classroom**	**Saturday 10/02/2021 @ 11:30pm**
M7- Differentiation, Accommodations, Modifications and Lab Safety	**Module 7: Differentiation, Accommodations, Modifications and Lab Safety Dropbox**	**Saturday 10/09/2021 @ 11:30pm**
M8- Teaching Physical Science for Understanding	**Module 8 -Teaching Physical Science for Understanding Assignment**	**Saturday 10/16/2021 @ 11:30pm**
M9- Teaching Life Science for Understanding	**Module 9 -Teaching Life Science for Understanding Assignment**	**Saturday 10/23/2021 @ 11:30pm**

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M10- Teaching Earth/Space Science for Understanding	**Module 10: Teaching Earth Space Science for Understanding Assignment**	**Saturday 10/30/2021 @ 11:30pm**
M11: Key Assessment	**REQUIRED ASSIGNMENT:** • **5E Lesson Plan** • **T-Tess Assessment** • **Reflection**	**Date Dependent on Classroom Observation (will vary)**
M12: TEKS UNwrappring	**REQUIRED ASSIGNMENT:** • TEKS UNwrapping	**Saturday 11/20/2021 @ 11:30pm**
Module 13: Final Assessment	**Required Assignment:** • **Constructed Application of Science Content and Pedagogy**	**Conducted in Class-Last week (11/29/2021-12/3/2021)**

References/Scientifically-Based Research/Additional Readings:

Atzori, P. (1996). Discovering CyberAntarctic: A Conversation with Knowbotics Research. *CTHEORY*. Available at: http://www.ctheory.com/

Brown, J.S., Collins, A. & Duguid, S. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18(1), 32-42.

Derry, S. (1992). Beyond symbolic processing: Expanding horizons in educational psychology. *Journal of Educational Psychology*, 413-418.

Derry, S. (1996). Cognitive Schema Theory in the Constructivist Debate. In *Educational Psychologist*, 31(3/4), 163-174.

Driver, R., Aasoko, H., Leach, J., Mortimer, E., Scott, P. (1994). Constructing scientific knowledge in the classroom. *Educational Researcher* , 23 (7), 5-12.

Ernest, P. (1995). The one and the many. In L. Steffe & J. Gale (Eds.). *Constructivism in education* (pp.459-486). New Jersey: Lawrence Erlbaum Associates,Inc.

Fosnot, C. (1996). Constructivism: A Psychological theory of learning. In C. Fosnot (Ed.) *Constructivism: Theory, perspectives, and practice*, (pp.8-33). New York: Teachers College Press.

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Gergen, K. (1995). Social construction and the educational process. In L. Steffe & J. Gale (Eds.). *Constructivism in education*, (pp.17-39). New Jersey: Lawrence Erlbaum Associates,Inc.
Hanley, Susan (1994). On Constructivism. Available at: http://www.inform.umd.edu/UMS+State/UMD-Projects/MCTP/Essays/Constructivism.txt
von Glasersfeld, E. (1996).Introduction: Aspects of constructivism. In C. Fosnot (Ed.), *Constructivism: Theory, perspectives, and practice*, (pp.3-7). New York: Teachers College Press.
Vygotsky, L. (1978). *Mind in Society: The Development of Higher Psychological Processes* MA: Harvard University Press.
Wilson, B. & Cole, P. (1991) A review of cognitive teaching models. *Educational Technology Research and Development*, 39(4), 47-64.
Wilson, B. (1997). The postmodern paradigm. In C. R. Dills and A. Romiszowski (Eds.), *Instructional development paradigms*. Englewood Cliffs NJ: Educational Technology Publications. Also available at: http://www.cudenver.edu/~bwilson/postmodern.html

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