

Claudius Clemmer College of Education

Curriculum & Instruction

SCED 3310

S.T.E.M. Content for the Elementary School Teacher

4 credit hours

Covers content in the areas of science, technology, engineering, and mathematics (STEM) and their interrelationship. A laboratory component involving inquiry-based research will expand on the course content of conceptual understanding, content, skills, and dispositions in STEM including understanding of the nature of STEM. Admission to Teacher Education required or permission of instructor.

Purpose and Goals

The purpose of this course is to introduce the integration of mathematics, science, technology, and engineering concepts in a global society.

The goals of this course are:

- To offer the opportunity to explore new ideas and new worlds related to science, technology, engineering, and mathematics (STEM) learning through hands-on, minds-on explorations and experiences and online content.
- To prepare undergraduates with STEM content knowledge suitable for elementary school settings.
- To facilitate the understanding of STEM concepts and the practice of new skills through exciting labs and other authentic learning experiences and the use of various digital and other media resources.

Major Course Topics

Exploring science, technology, engineering, and mathematics; the nature of STEM; designing, implementing, and assessing STEM activities.

Students will demonstrate personal understanding about the nature of STEM in relation to doing authentic research problem statements. They will also demonstrate a conceptual understanding of engineering, mathematics, physical, life, and earth science concepts relevant to introductory STEM curricula. Finally, they will perform authentic scientific research and demonstrate command of conceptual understanding of the content knowledge through a multimedia presentation of the research findings and researching assigned topics.

Learning Outcomes

At the completion of this course, the student is expected to:

- Demonstrate STEM content knowledge effectively using written and oral language

- Determine how to use mathematics and data representation in a STEM context
- Exhibit understanding of scientific and engineering practices
- Utilize technology appropriately in lab and presentation setting

Major Assignments

Module I: Nature of STEM (40 points possible)

Position Paper on STEM in a global society and class presentation (10 points)

Approximately 5 pages including

- an introduction
- 3-4 peer-reviewed citations
- connection to the local community
- connection to regional community
- connection to the national community
- connection to the global community
- APA formatting
- 2 figures or tables

Lab 1: Time Keeping Device – Integration of math, science, engineering, and technology (10 points)

Lab 2: Observing Daily, Monthly, and Annual Motion of the Sun and Moon (10 points)

Design project that applies innovative technology (10 points)

Technologies include: probes, sensors, interactive software, spreadsheets, graphing programs, multimedia documentation

Must include data collection, analysis, and reflection

Module II: Mathematics in a Framework of STEM (30 points possible)

Measurement – Capturing Observations in Mathematics, Science, and Engineering using Technology

Lab 1: Formal Approaches and Techniques of Measurement (10 points)

Organizing Data in Science and Mathematics

Lab 2: Using Charts and Graphs (10 points)

Lab 3: Modeling Appropriate Mathematical and Scientific Language (10 points)

Module III: Science and Engineering (30 points possible)

Nature of Science and Engineering Practices

Lab 1: Exploring Science: activities to engage in science from the kitchen to the backyard (5 points)

Lab 2: Engineering Design: Invent it. Build it. (5 points)

Exploring Concepts of Force and Motion

Lab 3: Constant Velocity (5 points)

Lab 4: Constant Acceleration – Horizontal Acceleration (5 points)

Lab 5: Constant Acceleration – Free-Falling Objects (5 points)
Lab 6: Terminal Velocity – Coffee Filters (5 points)

Grade Assignments

Module I: Nature of STEM (40 points possible)
Position paper 10 points
Labs 20 points
Project 10 points

Module II: Mathematics in a Framework of STEM (30 points possible)
Labs 30 points (10 points each)

Module III: Science and Engineering (30 points possible)
Labs 30 points (5 points each)

Grading Scale

Percentage	Letter Grade
100 - 94	A
93 - 92	A-
91 - 90	B+
89 - 83	B
82 - 81	B-
80 - 79	C+
78 - 73	C
72 - 71	C-
70 - 69	D+
68 - 62	D
Below 62	F

Attendance Policy

Absences are discouraged. Any student who misses more than 20% of classes will receive a failing grade.

Other Information

ETSU Honor Code

All students are expected to uphold the ETSU Honor Code. If you are not familiar with this statement and with the policy regarding plagiarism, we suggest you review both these documents online or in a current catalog.

As teacher candidates, students should be above reproach in matters of academic honesty. Candidates are expected to uphold ETSU's policies on plagiarism and similar offenses:

Academic misconduct will be subject to disciplinary action. Any act of dishonesty in academic work constitutes academic misconduct. This includes plagiarism, the changing or

falsifying of any academic documents or materials, cheating, and the giving or receiving of unauthorized aid in tests, examinations, or other assigned school work. Penalties for academic misconduct will vary with the seriousness of the offense and may include, but are not limited to: a grade of F on the work in question, a grade of F for the course, reprimand, probation, suspension, and expulsion. For a second academic offense the penalty is permanent expulsion. Plagiarism, cheating, and other forms of academic dishonesty are prohibited. Students guilty of academic misconduct, either directly or indirectly through participation or assistance, are immediately responsible to the instructor of the class. In addition to other possible disciplinary sanctions which may be imposed through the regular institutional procedures as a result of academic misconduct, the instructor has the authority to assign an "F" or a zero for the exercise or examination, or to assign an "F" in the course.

Diversity Statement

ETSU commits itself to creating and perpetuating an environment in which diversity of people and thought is respected. Our aspiration is to create a university that fully appreciates the culture and the history of its surrounding region while it seeks to understand and accept the practices, beliefs, and customs of the greater global community.

Writing Center

ETSU maintains the Writing and Communication Center to provide individual assistance to students. The center is located in the library and has extensive hours. It is suggested that you make an appointment to ensure someone is available to help you without waiting.

Mental Health

Students often have questions about mental health resources, whether for themselves or a friend or family member. There are many resources available on the ETSU Campus, including: ETSU Counseling Center (423) 439-4841; ETSU Behavioral Health & Wellness Clinic (423) 439-7777; ETSU Community Counseling Clinic: (423) 439-4187. If you or a friend is in immediate crisis, call 911. Available 24 hours per day is the National Suicide Prevention Lifeline: 1-800-273-TALK (8255).

Accommodations:

It is the policy of ETSU to accommodate students with disabilities, pursuant to federal law, state law and the University's commitment to equal educational opportunities. Any student with a disability who needs accommodation, for example arrangement for examinations or seating placement, should inform the instructor at the beginning of the course. Faculty accommodation forms are provided to eligible students by Disability Services. Disability Services is located in the D.P. Culp Center, Room 326, telephone 439-8346. <http://www.etsu.edu/disable/>

Required Textbook(s)

Davis, G. A., & Keller, J. D. (2009) *Exploring Science and Mathematics in a Child's World*. New Jersey: Pearson. ISBN-13: 9780130945228

This textbook presents appropriate math, science, engineering, and technology content appropriate for an elementary school context.

Bibliography, Recommended Readings, and/or Supplemental Materials

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