

EDUC 4360

Special Topics: Perspectives in STEM Education

Spring 2025

Time: Online with Synchronous Sessions

Day: TBD

Final: (Online)

Instructor Information:

Michael Odell, Ph.D.

Office: HPR 263A

Office Hours: Office Hours: Zoom or Phone by appointment.

Telephone: office (903) 566-7132

Email address: modell@uttyler.edu (best way to contact)

Course Description:

This course helps future STEM educators understand that science is a dynamic human endeavor that has been shaped by practical needs, social conflicts, and individual personalities. In this course, students prepare lesson plans that incorporate historical science and mathematics content.

Hybrid Schedule (See Schedule in Canvas)

Student Learning Outcomes:

- Demonstrating the methods and nature of science and math through real-life examples of discovery in practice.
- Building cross-curricular connections within the STEM disciplines and beyond in the arts and humanities.
- Humanizing scientists and mathematicians and addressing issues of diversity in STEM
- Exploring the ethics, values, and social context of science and math.
- Explore Resources related to the History, Science, and Philosophy of STEM

Resources

Pedagogy: Resources on HPS in STEM education

Current education research makes a strong case for STEM teaching that is informed by the history and philosophy of science and math.

[Read more](#)

Meeting the Standards

National and state standards for science and math teaching already include substantial requirements for teaching the history and nature of science and math.

[Read more](#)

A selection of books on the role of history in STEM education

- [Allchin, D. Teaching the Nature of Science: Perspectives & Resources. SHiPS Education Press, 2013](#)

EDUC 4360

Special Topics: Perspectives in STEM Education

Spring 2025

- [Bevilacqua, F., et al. Science Education and Culture: The Contribution of History and Philosophy of Science. Springer, 2001.](#)
- [Bruneau, O. et al. \(eds.\) Innovative Methods for Science Education, Frank & Timme, 2012](#)
- [Calinger, R. Vita Mathematica: Historical Research and Integration With Teaching. Cambridge University Press, 1996.](#)
- [Fauvel, J., and J. van Maanen. History in Mathematics Education: The ICMI Study. Kluwer Academic Publishers, 2000.](#)
- [Hagen, J. B., et al. Doing Biology. Harper Collins College Publishers, 1996.](#)
- [Heering, P., and D. Osewold \(eds.\) Constructing Scientific Understanding Through Contextual Teaching. Frank & Timme, 2007.](#)
- [Herreid, C. F. \(ed.\) Start with a story: The case study method of teaching college science. NSTA press, 2007.](#)
- [Jardine, D., & Amy Shell-Gellasch, eds. Mathematical time capsules: Historical modules for the mathematics classroom. MAA 2010.](#)
- [Katz, V., \(ed.\) Using History to Teach Mathematics: An International Perspective. Cambridge University Press, 2000.](#)
- [Kumar, D. D., and D.E. Chubin. Science, Technology, and Society: A Sourcebook on Research and Practice. Springer, 2000](#)
- [Matthews, M. R. \(ed.\) History, Philosophy and Science Teaching: New Perspectives. Springer, 2018.](#)
- [Matthews, M. R. Science Teaching. Revised & expanded ed., Routledge, 2015](#)
- [Matthews, M. R. \(ed.\) International Handbook of Research in History, Philosophy and Science Teaching. Springer, 2014.](#)
- [Matthews, M. R. Science Teaching: The Role of History and Philosophy of Science. Routledge, 1994.](#)
- [Swetz, Frank, John Fauvel, Bengt Johansson, Victor Katz, and Otto Bekken, eds. Learn from the masters. MAA, 1995.](#)

Online resources about history and philosophy in STEM education

- [SHiPS Resource Center for science teachers using Sociology, History and Philosophy of Science](#)
- [Understanding Science](#)

Open Source Textbook

[https://openlibrary-repo.ecampusontario.ca/jspui/bitstream/123456789/605/1/Introduction-to-History-and-Philosophy-of-Science-1559572706. print%20%281%29.pdf](https://openlibrary-repo.ecampusontario.ca/jspui/bitstream/123456789/605/1/Introduction-to-History-and-Philosophy-of-Science-1559572706_print%20%281%29.pdf)

Online Videos

Day the Universe Changed:

<https://archive.org/details/the-day-the-universe-changed-s01e01-the-way-we-are>

<https://archive.org/details/the-day-the-universe-changed-s01e02-the-way-we-are>

<https://archive.org/details/the-day-the-universe-changed-s01e03-the-way-we-are>

EDUC 4360

Special Topics: Perspectives in STEM Education

Spring 2025

<https://archive.org/details/the-day-the-universe-changed-s01e04-the-way-we-are>

<https://archive.org/details/the-day-the-universe-changed-s01e05-the-way-we-are>

<https://archive.org/details/the-day-the-universe-changed-s01e06-the-way-we-are>

<https://archive.org/details/the-day-the-universe-changed-s01e07-the-way-we-are>

<https://archive.org/details/the-day-the-universe-changed-s01e08-the-way-we-are>

<https://archive.org/details/the-day-the-universe-changed-s01e09-the-way-we-are>

<https://archive.org/details/the-day-the-universe-changed-s01e10-the-way-we-are>

<https://archive.org/details/thedaytheuniversechanged10changingknowledgechangingreality>

Course Objectives and Expectations:

Activities	% Grade
Attendance	10
Assignments (See Canvas)	
• Readings and Videos Reflections	20
• Interdisciplinary Lesson Plans (2) 5E and PBL	25
• Video Project (Historical Perspective of Your STEM Area)	30
• Scientific Communication (Posters and Presentations)	15
TOTAL	100

Grading Scale: A=90-100; B=80-89; C= 70-79; D=60-69; F <60

Related Clinical Experiences: Clinical Hours will be completed in EDUT 2170.

Course Policies:

1. Attendance and Participation

A large portion of your grade is based on attendance and active participation in all class sessions and assignments. Credit for attendance requires arriving to each class session on time, participating in all class activities, and staying until the session ends. Attendance is a crucial component of this class because during class time you will: 1) plan and practice your lessons with your partner; 2) get feedback from the Instructors and other members of the class; and 3) observe and learn from demonstration lessons. Because the course meets only once per week and there are no texts, missing class means you will miss essential information and experiences. Furthermore, Step 1 students will be working with a partner, and this collaboration is vital to your success. The workload for each lesson should be shared equally. If you are not in class, you inconvenience your partner by forcing him or her to work with you outside of class. If you miss a class, it is your responsibility to communicate with your partner about how to coordinate the next lesson. Don't leave your partner guessing about why you are not in class, or how and when you will get together.

EDUC 4360

Special Topics: Perspectives in STEM Education

Spring 2025

2. Late Work

There will be a deduction of 10% per day (capped at 50%) for any assignment turned in late unless arrangements have been made with the Instructor.

UNIVERSITY POLICIES

UT Tyler Honor Code

Every member of the UT Tyler community joins together to embrace: Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

For a full list of university policies including information related to the topics listed below, click [here](#).

- Students Rights and Responsibilities
- Campus Carry
- Tobacco-Free University
- Grade Replacement/Forgiveness and Census Date Policies
- State-Mandated Course Drop Policy
- Disability Services
- Student Absence due to Religious Observance
- Student Absence for University-Sponsored Events and Activities
- Social Security and FERPA Statement
- Emergency Exits and Evacuation
- Student Standards of Academic Conduct

UT Tyler Resources for Students:

- UT Tyler Writing Center (903.565.5995), writingcenter@uttyler.edu, <http://www.uttyler.edu/writingcenter/>
- UT Tyler Tutoring Center (903.565.5964), tutoring@uttyler.edu, <https://www.uttyler.edu/tutoring/>
- The Mathematics Learning Center, RBN 4021, This is the open access computer lab for math students, with tutors on duty to assist students who are enrolled in early-career courses.
- UT Tyler Counseling Center (903.566.7254) <https://www.uttyler.edu/counseling/>

[University Guidelines, Links and Policies](#)

COLLEGE OF EDUCATION AND PSYCHOLOGY (CEP) VISION AND MISSION

Vision: The College of Education and Psychology is nationally recognized and respected for its academic programs and opportunities. It is a center of academic excellence, scholarly inquiry, and public service. The College prepares leaders to meet the critical challenges of the 21st Century through productive contributions to local and global communities and toward individual and cultural equity.

EDUC 4360

Special Topics: Perspectives in STEM Education

Spring 2025

Mission: The mission of the College of Education and Psychology is to provide a positive environment that fosters the acquisition of knowledge and skills. The mission is individually and collectively realized through a community of scholars that contributes to knowledge through scholarly inquiry; organizes knowledge for application, understanding and communication; and provides leadership and service. We affirm and promote global perspectives that value individual and cultural diversity to enhance learning, service, and scholarship.

UT TYLER'S SCHOOL OF EDUCATION STANDARDS FOR EDUCATOR PREPARATION PROGRAMS

[Texas Education Standards](#): The School of Education are committed to teaching and implementing the Texas Educator Standards at the highest level. The School of Education faculty use the Texas Education Standards, along with the Interstate New Teacher Assessment and Support Consortium (InTASC) standards used by educator preparation programs throughout the United States.

The list of [Texas Education Standards](#) can be accessed [here](#).

Access the [*Code of Ethics and Standard Practices for Texas Educators*](#).