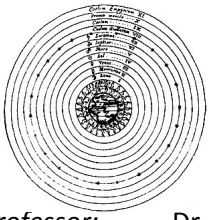
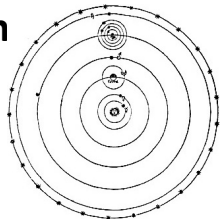


Perspectives on Science and Math

UTeach—HIS 329U Spring 2018

Lecture: MWF 11-12 *or* 3-4, PAI 4.18
Discussion Section: M 12-1 *or* 4-5



Professor: Dr. Megan Raby
meganraby@austin.utexas.edu
512-475-7925

TA: Sarah Jenevein
sjenevein@utexas.edu

Office Hours: GAR 0.114, arrange for alternative accommodations by email.
M 1:00-2:50, and by appointment

SZB 462
1:00-2:50, and by appointment

University Writing Center Course Specialist Consultant (CSC): Catherine Gregoire
uwc.utexas.edu or 512-471-6222

Course Description:

Perspectives on Science and Math explores the intellectual, social, and cultural history of science and mathematics, focusing on the 17th century to the present. This is an upper-division history course designed for students in UTeach Natural Sciences, in order to expand your understanding of subjects you will teach in the future.

This course has four interlocking objectives:

- to examine the development of science and math as a historical process, shaped by people and a part of broader social and cultural changes over time.
- to enable you to use this larger historical perspective to enrich your own classroom teaching.
- to improve your ability to research, analyze, and evaluate information.
- to improve your writing and communication skills.

This is a Writing Flag course. It is designed to give you experience writing within an academic discipline—in this case, history. You will write regularly during the semester, receive feedback to help you revise your writing, and have the opportunity to read and discuss your peers' work. For more information about Writing Flag courses, see http://www.utexas.edu/ugs/flags/students/about/writing.

This course also fulfills the Social & Behavioral Sciences core requirement and addresses the following objectives established by the Texas Higher Education Coordinating Board: communication skills, critical thinking skills, empirical and quantitative skills, and social responsibility.

Readings:

One required textbook is available for purchase at the University Co-op bookstore. A copy is also available on reserve at PCL:

> Ede, Andrew, and Lesley B. Cormack. A History of Science in Society: From Philosophy to Utility. 3rd ed. University of Toronto Press, 2016.

Not required, but on reserve at PCL and recommended—especially for future math teachers—is:

> Berlinghoff, William P., and Fernando Q. Gouvêa. *Math Through the Ages: A Gentle History for Teachers and Others*. Expanded 2nd ed. Farmington, ME: Oxton House/Mathematical Association of America, 2015.

We will also refer a free online handbook for students of history:

> Rael, Patrick. *Reading, Writing, and Researching for History: A Guide for College Students.* Brunswick, ME: Bowdoin College, 2004. https://courses.bowdoin.edu/writing-guides

Additional required primary and secondary source readings listed in the schedule below will be posted on our course's Canvas site. You will also use Canvas to communicate and collaborate online, check grades, submit assignments, and complete online homework. Canvas support is available at http://canvas.utexas.edu.

Assignments and Evaluation:

Participation (includes attendance)	10%
Reading Comprehension/Reflection (C/R) Questions	25%
Essays	25%
5E Lesson Plan Project (group project)	40%

Participation

Participation means active involvement in class discussion and activities, both in lecture and discussion sections. To be prepared, you must actively read and take notes on the assigned texts, as well as physically bring the texts and your notes to class. In class, good participation means speaking up to ask and answer questions, taking notes, and collaborating with classmates in group activities. To understand how participation is evaluated, please see the Participation Rubric on Canvas.

Reading Comprehension/Reflection (C/R) Questions

At least once a week you will respond to a set of questions to guide you active reading of course material. Some questions will assess your comprehension of assigned readings, others will as you to reflection on and synthesize historical material. Questions may draw on readings up to and including those scheduled for the upcoming class day. In general, these will be submitted on Canvas and due by 8am before class—late assignments will not be accepted. This category also includes occasional in-class writing, activities, and peer reviews.

Essays

Throughout the semester, you will write 3 short (750-1,000 word) essays that will ask you to apply historical research and thinking to a problem related to STEM teaching. In these, you will demonstrate your historical skills in evaluating evidence and constructing sound arguments, however these will not take the form of traditional history class essays. Rather, they will be real-world writing assignments geared toward developing your ability to communicate in public and professional contexts as a STEM educator. Essays will be submitted on Canvas, due at the beginning of the class period. A 5% deduction applies for each day late.

5E Lesson Plan Project

A key take-away from this class will be a lesson plan you can put to use in your UTeach portfolio and your own future classroom. In it, you will apply a historical perspective to enhance the teaching of a science or math concept, the nature of science or math, and/or the role of science and math in society. This group project includes a written 5E lesson plan and presentation to your classmates, with peer review and revisions. This lesson plan will demonstrate your mastery of the research, communication, and historical thinking skills developed throughout the course. For guidance, see https://perspectives.uteach.utexas.edu.

Grading System

A	*A-*	*B+*	*B*	*B-*	*C+*	*C*	*C-*	*D+*	*D*	*D-*	*F*
100% to 94%	< 94% to 90%	< 90% to 87%	< 87% to 84%	< 84% to 80%	< 80% to 77%	< 77% to 74%	< 74% to 70%	< 70% to 67%	< 67% to 64%	< 64% to 61%	< 61% to 0%

Office Hours

You are welcome and encouraged to meet with me to discuss course material and strategies for effective studying and writing. If you wish to dispute a grade, be aware that re-grading may result in a lower score.

My office is a gun free space. UT-Austin policy (HOP 8-1060, VII-C) requires me to give oral notice of my prohibition on concealed handguns in my office. For this reason, my door will remain closed during office hours so that I can provide notice to visitors before they enter. I recognize that this is awkward. Nevertheless, please know that I welcome you into my office for free and open discussion.

University Writing Center (UWC) and Your Course Specialist Consultant (CSC)

I strongly encourage you to use the services offered by the UWC, located in the PCL Learning Commons (PCL 2.330). While the UWC's generalist consultants can help any UT student with any piece of writing at any stage, CSCs are dedicated to particular writing intensive classes. CSCs communicate with the professor of their assigned class, attend some of the meetings, get familiar with their class's writing assignments, and thus can offer course-specialized writing help in 45-minute consultations. CSC consultations are scheduled by appointment, and students in this class have scheduling priority with their CSC.

Catherine Gregoire is the CSC for our course. Her hours at the UWC are M 10:30am -1:30pm, T 6-8pm, W 10am-1pm, Th 6-8pm. To make an appointment, go to https://utexas-insight.symplicity.com or call 512-471-6222. If your CSC is not available when you wish to meet, or if you wish to work on an assignment for a different class, please make an appointment with a generalist consultant.

Documented Disability Accommodations

Any student with a documented disability who requires academic accommodations should contact Services for Students with Disabilities (SSD) at 512-471-6259 (voice) or 1-866-329-3986 (video phone). Faculty are not required to provide accommodations without an official SSD accommodation letter.

Attendance

Regular class attendance is imperative to success in this course (see "Participation" above and the Participation Rubric on Canvas). It is your responsibility to sign the attendance sheet when you enter class. You are allowed 2 unexcused days of absence without penalty. Each additional unexcused absence will reduce your Participation grade by 5 points. UT Austin policy requires you to notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class or assignment in order to observe a religious holy day, I will give you an opportunity to complete the missed work within a reasonable time after the absence. If you miss an in-class assignment for an official UT extracurricular activity, documented illness, or emergency, it may qualify as an excused absence, and you should discuss with me the possibility of making up the assignment. If you miss a lecture or class activity, borrow notes from a classmate.

Electronic Devices

In order to be fully attentive in class and avoid distracting your classmates, put away your phone (turn off or set to silent) and other electronic devices unless their use is an explicit part of a class activity. Using a laptop (with wifi disabled) or and e-reader to take notes and view assigned pdfs is permitted, but I strongly encourage you to make the investment in printing the readings and taking notes by hand. If you abuse your privilege to use electronic devices you will no longer be permitted to use them in our classroom. Audio or video recording in class is not permitted without an SSD accomodation and prior approval.

Weapons Policy

No weapons may be brought into the classroom, with the exception of licensed concealed handguns. If you see a gun, leave the classroom and call 911 so that law enforcement personnel can take appropriate action.

Course participants with a license to carry a handgun must keep it concealed and on their person at all times. Handguns may not be brought to the classroom in backpacks, bags, or purses. Course participants may be called upon at unpredictable times to move about the room, go to the front of the room and participate in a presentation, or otherwise be separated from their belongings. University policy and the implementation of the law would be violated by the separation of the gun owner from their weapon that would result from these required classroom activities. No weapons of any kind may be brought into the professor's office. Course participants will be given oral notice excluding handguns from my office and will sign a statement acknowledging this notification. If you have concerns, comments, or questions about UT's effort to comply with S.B. 11, I encourage you to contact those in charge of implementation: campuscarry.utexas.edu (bottom-right of page).

Behavior Concerns Advice Line

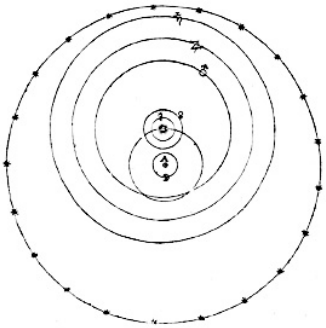
If you have concerns about the behavior or well-being of another member of the campus community, call BCAL at 512-232-5050.

Academic Integrity

Using the words and ideas of others without giving credit with an appropriate citation is plagiarism and a violation of the University of Texas Honor Code. Whether accidental or intentional, plagiarism will result in a failure of the assignment and could lead to further disciplinary action. Before the first essay is due, complete the plagiarism quiz linked on our Canvas site to be sure you understand what plagiarism is and to minimize your risk of committing it. Please feel free to come talk to me or your TA about effective note-taking and citation strategies.

Course Schedule

This syllabus represents my current plans. As we go through the semester, these plans may be adjusted to enhance class learning. I will communicate any such changes clearly in class and through Canvas. Primary sources are marked (*). Due dates marked below, including online submissions, are by the beginning of the class meeting time on that day.



Week 1: Introductions and Guiding Questions

Jan. 23 Read the syllabus and other first-day handouts.

Jan. 25 Ede and Cormack, Introduction & Chapter 1 (xiii-27).
Berlinghoff and Gouvêa, 1-25.

Week 2: Textbook Histories of Math and Science

Jan. 28 **Field Trip: Meet at PCL, Learning Lab 2**
Zaman, Muhammad H. "Why Science and Engineering Need to Remind Students of Forgotten Lessons From History." *The Conversation*, August 15, 2016. https://theconversation.com/why-science-and-engineering-need-to-remind-students-of-forgotten-lessons-from-history-61356.

Discussion Section—Nature of science & math

Jan. 30 *Guest speaker: Jesús Aguilar (UTeach alumnus, teacher at NYOS Charter School)*

Feb. 1 Ede and Cormack, Chapter 2 (29-65).
Berlinghoff and Gouvêa, 25-33.

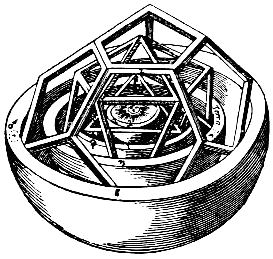
Week 3: The Story of Math

Feb. 4 Ede and Cormack, Chapter 3 (67-93).
Berlinghoff and Gouvêa, 33-62.
Swetz, Frank J. "Pantas' Cabinet of Mathematical Wonders" *Convergence* (May 2015). www.maa.org/press/periodicals/convergence/pantas-cabinet-of-mathematical-wonders-images-and-the-history-of-mathematics. (Click through to read entire—6 pages.)
Mathematical Treasures, *Convergence*, https://www.maa.org/press/periodicals/convergence/index-to-mathematical-treasures. (Browse.)

Discussion Section—Tools for teaching: Historical objects

Feb. 6 *Guest speaker: Lauren Siegel, Co-Founder and Director of MathHappens*

Feb. 8 **Essay 1 Textbook Histories Due**



Week 4: How Do We Know?

Feb. 11 Ede and Cormack, Chapter 4 (95-131).

Discussion Section—Tools for teaching: Role playing

Feb. 13

Feb. 15 Ede and Cormack, Chapter 5 Introduction through "Mathematical Practitioners" (133-139).
Rael, "How to Read a Primary Source."
* Bacon, Francis. Selections from *The New Organon or: True Directions Concerning the Interpretation of Nature* (1620), from the version presented at www.earlymoderntexts.com.
*Descartes, René. Selections from *Discourse on the Method of Rightly Conducting one's Reason and Seeking Truth in the Sciences* (1637), from the version presented at www.earlymoderntexts.com.

Week 5: Facts, Experiments, Laws

Feb. 18 Ede and Cormack, Chapter 5 "New Models of the Universe" through "Newton and the Experimental Method" (139-157).

*Newton, Isaac. Selections from "A letter to the Royal Society presenting A new theory of light and colours" (1671), in the version presented at www.earlymoderntexts.com.

Discussion Section—Tools for teaching: A historical experiment

Feb. 20 Ede and Cormack, Chapter 5 "New Scientific Organizations" through Conclusion (158-167).

Feb. 22

Week 6: Enlightenment Science

Feb. 25 Ede and Cormack, Chapter 6 Introduction through "The Industrial Revolution and the Study of the Earth" (169-189).

TBA

Discussion Section—Tools for teaching: Narratives for diversity and inclusion

Feb. 27

Mar. 1 *Guest speaker: Carol Ramsey, UTeach Computer Science & stemxstory.com*

Essay 2 Due

Week 7: Finding Order in Nature

Mar. 4 Ede and Cormack, Chapter 6 "Museum Collections and Scientific Expeditions" through Chapter 7 "Catastrophe or Uniformity" (189-215).

Discussion Section—History Research Lab

Mar. 6

Mar. 8 **Field trip: Meet at the Harry Ransom Center (HRC) (2nd floor waiting area)**

Week 8: "One long argument"

Mar. 11 Ede and Cormack, Chapter 7 "The Question of the Origin of Species" through "Connections: Science and Class" (215-221).

Discussion Section—Lesson Planning: Backwards design

Mar. 13 *Darwin, Charles. "Contents," "Introduction," and "Recapitulation and Conclusion." In *On the Origin of Species*, 1st ed, v-6, 459-490. London: John Murray, 1859. https://archive.org/details/onoriginofspec00darw

Mar. 15 **Field trip: Meet at the Texas Memorial Museum**

Week 9: Spring Break!

Week 10: Brave New Worlds

Mar. 25 Ede and Cormack, Chapter 7 "Herbert Spencer and Social Darwinism" through Chapter 9 "Mendel and the Mechanism for Evolution" (221-287).

Discussion Section—Lesson Planning: Engage/Explore Workshop

Mar. 27 Watch: https://www.facinghistory.org/resource-library/video/genetics-eugenics-and-ethics (12 min.)

Read the entries for Britain, the U.S., and at least one other country of your choice, here: http://eugenicsarchive.ca/discover/world/530b935f76f0db569b000003 (and feel free to explore the whole eugenicsarchive.ca site)

Mar. 29 "The Supreme Court and the Sterilization of Carrie Buck," https://www.facinghistory.org/resource-library/supreme-court-and-sterilization-carrie-buck

Browse and read at least one of the virtual exhibits: http://www.eugenicsarchive.org/eugenics/list3.pl

Week 11: A Textbook Case

Apr. 1 Shapiro, Adam R. "Civic Biology and the Origin of the School Antievolution Movement." *Journal of the History of Biology* 41, no. 3 (2008): 409–433. https://www-jstor-org.ezproxy.lib.utexas.edu/stable/40271485?origin=JSTOR-pdf&seq=1#page_scan_tab_contents

*Hunter, George W. *A Civic Biology: Presented in Problems*. New York: American Book Company, 1914: archive.org/details/civicbiologypres00huntrich. Browse through the book, examining its organization and coverage of evolution (see especially pages 192-196).

Listen to "Episode 65: Darwinism and the Scopes 'Monkey Trial,'" *Not Even Past*: 15minutehistory.org/2015/03/05/episode-65-darwinism-and-the-scopes-monkey-trial.

Discussion Section—Lesson Planning: Explain/Elaborate Workshop

Apr. 3

Apr. 5 *Transcript of "The Judge Speaks," *NOVA,* http://www.pbs.org/wgbh/nova/evolution/judge-speaks.html

Scott, Eugenie C. "Cans and Can'ts of Teaching Evolution," National Center for Science Education, https://ncse.com/library-resource/cans-cants-teaching-evolution

Branch, Glenn. "Antiscience legislation dies in Texas," National Center for Science Education Blog, May 8, 2017, https://ncse.com/news/2017/05/antiscience-legislation-dies-texas-0018533

Week 12: Science and War

Apr. 8 Ede and Cormack, Chapter 9 "Science and War" through "National Security and Science Policy" (288-320).

Hashimoto, Isao. "1945-1998," https://www.ctbto.org/specials/1945-1998-by-isao-hashimoto (Animation, 14 minutes.)

Discussion Section—Lesson Planning: Assessment Workshop

Apr. 10 Ede and Cormack, Chapter 9 "Discovering DNA" through "Conclusion," and Chapter 12 "DNA and the Human Genome Project" through "Conclusion" (320-325, 377-385).

Apr. 12

Week 13: Math and Politics

Apr. 15 Phillips, Christopher J. "'In Accordance With a "More Majestic Order': The New Math and the Nature of Mathematics at Midcentury." *Isis* 105, no. 3 (2014): 540–563. https://www-jstor-org.ezproxy.lib.utexas.edu/stable/10.1086/678170

Phillips, Christopher J. "The Politics of Math Education." *The New York Times*, December 3 2015. https://www.nytimes.com/2015/12/03/opinion/the-politics-of-math-education.html.

Ede and Cormack, Chapter 11 Introduction, and "The Space Race" through "Conclusion" (327–329, 337-353).

Discussion Section—Lesson Planning: Microteaching

Apr. 17 **Lesson Plan Presentation**

Apr. 19 **Lesson Plan Presentation**

Week 14: Science, Industry, and the Public

Apr. 22 *Carson, Rachel. Selections from *Silent Spring*, 1-13, 85-100. Boston: Houghton Mifflin, 1962.

Ede and Cormack, Chapter 12 Introduction through "Connections: Earth Day and the Rise of Environmentalism" (355-377).

Stoll, Mark. "Rachel Carson's *Silent Spring*, A Book that Changed the World," *Environment and Society Portal*, 2012. www.environmentandsociety.org/exhibitions/silent-spring (Browse the exhibit).

Discussion Section—**Lesson Plan Presentation**

Apr. 24 **Lesson Plan Presentation**

Apr. 26 **Lesson Plan Presentation**

Week 15: A Tectonic Shift

Apr. 29 McPhee, John. Selections from *In Suspect Terrain*. Macmillan, 1983.

Ede and Cormack, Chapter 11 "The International Geophysical Year" through "Mapping the Universe" (330-337).

Discussion Section—**Lesson Plan Presentation**

May. 1 **Lesson Plan Presentation**

May. 3 **Lesson Plan Presentation**

Week 16: Contemporary Debates, Historical Perspectives

May. 6 Weart, Spencer. Selections from *The Discovery of Global Warming*. *www.aip.org/history/climate/index.htm* **(**See links and explanation on Canvas C/R.)

"Why Climate Change Isn't Taught: Problems and Solutions," National Center for Science Education, https://ncse.com/library-resource/teaching-climate-change-best-practices

"Teaching Climate Change: Best Practices," National Center for Science Education, https://ncse.com/library-resource/teaching-climate-change-best-practices

Ede and Cormack, Chapter 13 (387-405).

Discussion Section—Reflection on lesson plans/Nature of science & math revisited

May. 8 TBA

May. 10 **Revised Lesson Plan Due, Final Essay Due**