Perspectives on Science and Math-UTeach

HIS 329U – 39265, 39270, 39275, 39280
Lectures: MWF 11:00 – 12:00, 2:00 – 3:00; 4.18 Painter Hall
Discussion sections: M 12:00 – 1:00; M 3:00 – 4:00; W 12:00 – 1:00; W 3:00 – 4:00

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Course Description

Perspectives on Science and Math explores the intellectual, social, and cultural history of science and math from the Renaissance to the present. It is designed for students in UTeach Natural Sciences. The course has four interlocking goals: to give you an overview of the history of science and mathematics, for your general education and to help you reflect on your own reasons and goals for teaching science or math; to enable you to put this broader history and context to work in science and mathematics pedagogy; to improve your writing, research and information analysis skills.

This is a writing flag class. Writing Flag courses are designed to give students experience with writing in an academic discipline. In this class, you can expect to write regularly during the semester, complete substantial writing projects, and receive feedback from your instructor to help you improve your writing. You will also have the opportunity to revise one or more assignments, and to read and discuss your peers' work. You should therefore expect a substantial portion of your grade to come from your written work. You are encouraged to take advantage of the resources provided by the Undergraduate Writing Center: http://www.uwc.utexas.edu.

The readings and lessons explore the why, how, and what of the history of science and math. We will attempt to identify and analyze the goals of natural philosophers, scientists, and mathematicians—why did they think the knowledge they made was important? We will investigate the practices by which people have established the *credibility* or *authority* of knowledge—how did people agree on what was true? And we will study the content of theories—what did people know? "We" is not a figure of speech here. This is a team taught class, and you are on the team. Nearly a third of the lessons will be developed and led by students.

Grading Policies

Plus/minus grades will be assigned.

Unless an extension is granted well in advance, the grade will drop a third of a letter for each day an assignment is late. "Sundry assignments" will not be accepted late.

Students with disabilities may request appropriate academic accommodations from Services for Students with Disabilities: 471-6259.

University policies on plagiarism and academic dishonesty will be enforced.

Assignments

Participation: 15%
Attendance will be taken and factored into your grade. One unexcused absence is allowed. In addition, active and insightful engagement in the lessons will be rewarded—everyone is expected to participate in discussions. Attendance and participation in sections is included here.

Sundry Assignments: 10%
These are ungraded or plus-check-minus assignments. Most are connected to a reading and are designed to improve comprehension and assure that you have completed the reading. They may include unannounced quizzes. The week you present your 5E Lesson, you will not be expected to complete any homework assignments.

Unit Reflections: 20% (10% each)
Three to four page written reflections on the readings, lectures, and discussions for the first and third units. Due the Monday after the end of the unit.

5E Lesson Plan: 35%
Working in pairs, you will prepare, present, and revise one 5E Lesson Plan integrating a historical topic into a science or math lesson. These lessons are considered part of the class, and should focus on an interesting or important historical idea or method. The 5E Lesson Plans will be critical for providing the intellectual history component of the course—i.e. *what* scientists and mathematicians knew. Handouts, examples, assessment lists, etc. will explain the assignment and establish clear expectations.

Midterm and Final Exams: 20% (10% each)
The exams will consist of short answer and identifications designed to evaluate students' comprehension and retention of material, as well as one short essay question.

Week 1: Introduction
Aug. 24: Who Cares about History?

Aug. 26: Who Cares about Science or Math?

Unit One: The Word and the World

Week 2: Other Worlds
Aug. 29: Knowledge and Utopia
Reading: Provide translation of excerpt from Chapter 7 of Plato *The Republic* (the entire chapter can be read at http://classics.mit.edu/Plato/republic.html)

Aug. 31: Alchemy: Microcosm and Macrocosm
Begin 5E Lesson Plan background paper

Sep. 2: Sample 5E Lesson Plan
Continue 5E Lesson Plan background paper

Week 3: Challenging Authority
Sep. 5: Labor Day

Sep. 7: Vesalius: Know Thyself
Reading: Preface and browse images in *De Fabrica* (http://vesalius.northwestern.edu)

Sep. 9: Copernicus: The Structure of Scientific Revolutions
Reading: Begin reading for Sep. 12th

Week 4: "The Scientific Revolution?"
Due in discussion section: Background papers for 5E Lesson Plans

Sep. 12: Galileo: Theology, Philosophy, Science
Reading: Stillman Drake, *Galileo* (1980), 1-8, 38-72. (Blackboard course documents)

Sep. 14: Theory vs. Practice
Katherine Hill, "Juglers of Schollers"? Negotiating the Role of a Mathematical Practioner," *BJHS* (Sep. 1998), 253-274. (Blackboard course documents)

Sep. 16: Asking Nature
Steven Shapin, "How Was it Known: Reading Nature's Book," in *The Scientific Revolution* (Chicago: Chicago University Press, 1998), 65-118—required to read only from p. 96 (section titled "How to Make an Experimental Fact"). (Blackboard course documents)

Week 5: The Enlightenment
Sep. 19: The Encyclopédie

Reading: Map of the System of Human Knowledge; Detailed explanation of the System of Human Knowledge; 3 articles from the Encyclopédie (http://quod.lib.umich.edu/d/did/index.html)

Sep. 21: The Clockwork Universe?
Reading: Richard G. Olson, "Newton's Religion, Newtonian Religions, and Eighteenth-Century Reactions," *in Science and Religion, 1450-1900* (Westport Conn.: Greenwood Guides to Science and Religion, 2004), 111-131. (Blackboard course documents)

Unit Two: Evolution

Sep. 23: What Is a Species?
Reading for Sep. 28

Week 6: Ordering Diversity
First Draft of Unit One Reflection Due in Section

Sep. 26: 5E Lesson Plan 1

Sep. 28: 5E Lesson Plans 2

Sep. 30: Natural Theology
Reading, Paley, *Natural Theology*, chapters 1-4 (http://darwin-online.org.uk/ [search: paley natural theology])

Week 7: The Struggle for Existence
Final Draft of Unit One Reflection Due in Section

Oct. 3: The Dismal Science
Thomas Malthus, *An Essay on the Principle of Population* (London, 1798), Chapters 1-5, 7 (Blackboard course documents)

Oct. 5: Nature Red in Tooth and Claw
Charles Darwin, *The Origin of Species,* Ch. 3 (http://darwin-online.org.uk/)

Oct. 7: 5E Lesson Plan 3

Week 8: Evolutionary Controversy

Oct. 10: 5E Lesson Plan 4

Oct. 12: The Scopes Trial
Ronald L. Numbers, “Introduction: Darwinism, Creationism, and Intelligent Design” and “The Scopes Trial: History and Legend” in *Darwinism Comes to America* (Cambridge, Mass.: Harvard University Press, 1998), 1-23, 76-92. (Blackboard course documents)

Oct. 14: 5E Lesson Plan 5

Unit Three: The Strange History of the Bell Curve

Week 9: Statistics
Oct. 17: Midterm Exam

Oct. 19: Social Physics and the Invention of the Normal Man
Reading: Adolphe Quetelet, *A Treatise on Man and the Development of His Faculties*, excerpts (Blackboard course documents)

Oct. 21: 5E Lesson Plans 6

Week 11: The Meaning of Biological Inequality

Oct. 24: Eugenics
Excerpt from Francis Galton, *Hereditary Genius* (1869)

Oct. 26: The Progressive Era & the Intelligence Quotient
Reading: Lewis M. Terman, "The Problem," in *Intelligence Tests and School Reorganization* (New York: World Book Co., 1923), 1-31. (Blackboard course documents)

Oct. 28: 5E Lesson Plan 7

Week 12: Science and Inequality

Oct. 31: The Liberal Antiracist Orthodoxy
Reading: Unesco, *Statement on Race* (Blackboard course documents)

Nov. 2: The Strange History of the Bell Curve
Reading: Excerpts from Richard J. Hernstein and Charles Murray, *The Bell Curve*, xxi-xxiii, 269-280, 311-315, 509-511, 523-526, 549-552 [25 pages total]
Stephen Jay Gould, "Critique of *The Bell Curve*," in *The Mismeasure of Man* (1996), 367-378.

Nov. 4: 5E Lesson Plans 8

Unit Four: Science and the Nation-State, or Science and the Common Good

Week 13: Improving Nature
First Draft of Unit Three Reflection due in Section

Nov. 7: Balancing the Books: Agricultural Chemistry

Nov. 9: Scientific Conservation
Reading: Garrett Hardin, "The Tragedy of the Commons," *Science* 162 (1968), 1243-1248. (Blackboard course documents)

Nov. 11: 5E Lesson Plans 9

Week 14: War and Science
Final Draft of Unit Three Reflection Due in Section

Nov. 14: 5E Lesson Plans 10

Nov. 16: The Legacy of WWII
Reading: "Education for a Better Nation and a Better World," in *Higher Education for American Democracy: A Report of the President's Commission on Higher Education* (1947), 5-23.
Vannevar Bush, "Letter of Introduction and Summary of Report," *Science, the Endless Frontier* (1945).

Nov. 18: The Sputnik Effect: Cold War and Science and Math Education

Week 15

Nov. 21: 5E Lesson Plans 11

Nov. 23: No Class

Nov. 25: Thanksgiving Break

Week 16: Manipulating the Scientific Commons

Nov. 28: 5E Lesson Plans 12

Nov. 3: Government Regulation: Smoking Science
Reading: Naomi Oreskes & Erik M. Conway, "Doubt is Our Product," in *Merchants of Doubt*, 10-35.

Dec. 2: Climate Change
Reading: Naomi Oreskes & Erik M. Conway, "The Denial of Global Warming," and "Epilogue: A New View of Science," in *Merchants of Doubt*, 169-215, 266-274.

Final Exam for 11-12 class: Sat. Dec. 10th, 9-Noon
Final Exam for 2-3 class: Wed. Dec. 7th, 2-5pm