

506:251 History of Science and Society

Fall 2014

Dr. Singerman

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Lecturer: Dr. David Singerman

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Lectures: Mondays and Wednesdays, 2:15-3:35 pm

209A Ruth Adams Building, Douglass Campus

Description

In this course, we'll ask how the modern enterprise called "science" came to be. This isn't a story of the progress of reason over ignorance or the triumph of light over darkness. Instead, we'll try to understand how and why certain kinds of questions, places, practices, and people—but not others—came to be called "scientific." A number of questions will guide us through the course. What counted as a legitimate way to produce knowledge about nature, and what did not? Who gets to do the work of science, who actually does it, and who takes the credit? How do people decide if a scientific result is credible? Does science only happen in laboratories, and if not, where? Is science something that European civilization spread to the rest of the world, or was it (and is it) something produced by the people of the planet as a whole? How is the practice of science taught, and how are its findings communicated? How do we define the boundaries between science and technology, reason and art, theory and practice, and good science and pseudoscience?

Over the course of the semester, you will have to ask yourself whether the answers to these questions can be found within "science" itself, or whether we have to look to science's relationship to politics, commerce, war, religion, philosophy, art—in short, what is usually considered "society" apart from "science." So what is the relationship between science and society—or are they even different things?

Policies

Attendance

You are required to attend every class and participate in class discussions. More than two unexcused absences will have an unpleasant effect on your grade. Every unexcused absence above the first two will subtract 2% from your final grade. (If you miss three classes unexcused, in other words, and you otherwise had earned 85%, your final grade will be 83%; miss a fourth,

81%; and so on.) Attendance will be determined by reading quizzes (see below), which will be collected ten minutes after the scheduled beginning of class.

For an absence to count as “excused,” I must receive a note from a dean, doctor, or coach that explains why you could not attend. Such notes will not be accepted more than one week (that is, two class sessions) after the absence itself. The earlier you let me know, the better. Being excused from that day’s lecture does *not* excuse you from the work your classmates did that day. You are still responsible for completing the assigned readings and producing the response paper, which should be handed in when the class meets next. You are also responsible for the material covered in lecture; this means finding a classmate who will lend you their notes, not asking me for mine.

Laptop policy

Laptops, tablets, e-readers, and phones are **not allowed** in lecture. If you are unable to take notes on paper, and need to use an electronic device, please produce a note from a doctor or the dean explaining why.

Plagiarism

There is no alternative to adhering to strict standards of academic integrity. This means properly acknowledging what work and words are yours and what is the work of others. I encourage all of you to read the University’s Writing Program’s pages on plagiarism (<http://wp.rutgers.edu/courses/plagiarism>) and you must understand Rutgers’s policy on academic integrity (<http://academicintegrity.rutgers.edu>). If you have any doubts as to whether something counts as plagiarism, **ask me**.

Assignments

—**Midterms.** There will be two in-class midterm examinations.

—**Final paper.** In lieu of a final exam, there will be a 5-6 page final paper that will count for **35%** of your grade. This paper will be due at 9am on the final day of class. Details of this assignment will be circulated a few weeks into the semester.

—**Reading responses.** Beginning the first full week of class, you will be required to post a response to that week’s readings onto the class Sakai site. These are an opportunity for you to engage with the primary and secondary sources that historians use. They do not have to be finely wrought essays, but they should be well-considered pieces of a few paragraphs, in which you develop an idea and grapple with its implications. You may consider a single reading in depth, weigh two readings against each other, evaluate one or more readings in light of lecture material, identify a contradiction—these are just a few of the possible avenues you can take, and you

should experiment with multiple ones over the course of the semester. I also encourage you to read each others' responses, and although your response may refer to points others have made, it must be fundamentally an analysis of the readings, not of your peers. These posts should be approximately 300-500 words (equivalent to 1-2 pages, double spaced). They must be posted by 11am on Monday of that week. Responses posted after 11am but before 2pm will receive half credit, and responses posted after 2pm will receive zero credit.

—**Reading quizzes.** At the very beginning of each class I will ask you to complete a reading quiz.. These will consist of a very small number (2-3) of simple and straightforward questions, and if you have done the assigned reading, you should be able to answer them right away. They will be collected ten (10) minutes after the beginning of class, and will be used to evaluate attendance. (If your answers are incorrect, you will still be marked “present” so long as the quiz is handed in on time.)

—**Participate in class discussions.** Engage with each other and with the readings. Don't be afraid to suggest an idea that you think might be controversial, as long as you do so respectfully of others.

Evaluation

—Each midterm will count for **20%** of your grade.

—The final paper will account for **35%** of your grade.

—**15%** of your grade will come from reading responses.

—**5%** of your grade will come from the reading quizzes.

—**5%** of your grade will come from your participation in class discussions.

—There will be **no** opportunities for extra credit.

Questions

I am happy to answer questions over email or in person. (If you can't make my office hours, we can set up another time that works.)

LECTURES AND READINGS

All readings will be posted (usually as PDF) on the course site on Sakai, except for Thomas Kuhn's *The Structure of Scientific Revolutions*, which you can purchase at the Rutgers University Bookstore, or which can be found in the University's library system.

Note: As the semester evolves, chances are I will decide to modify at least some of the lecture topics and add or subtract assigned readings. You will receive notice of any changes by email at least two class sessions in advance, and I will also explain the change in lecture.

1: Introduction to science and society

Week 1

September 3 — Introductions and overview of the course

Week 2

September 8 — How should we approach the study of science and society?
Thomas Kuhn, *The Structure of Scientific Revolutions*, chapters I-III, V-VI

September 10 — Laboratory life
Kuhn, *Structure*, chapters IX, X, XIII

2: Redrawing the boundaries of knowledge

Week 3

September 15 — The “Copernican Revolution”
Ptolemy, *The Almagest*, trans. R. C. Taliaferro (selections).
Nicolas Copernicus, *On the Revolutions of the Heavens* [1543], trans. Edward Rosen (selections).

September 17 — Astronomy and patronage
Galileo Galilei, *Siderius Nuncius: or The Starry Messenger*.
Galileo Galilei, *Dialogue on the Two Chief World Systems, Ptolemaic and Copernican*, translated by Stillman Drake (Berkeley: University of California Press, 1967), pp. 1-7, 339-56.
Johannes Kepler, *Mysterium Cosmographicum* [1596], trans. A. M. Duncan (New York: Arabis, 1981), 62-73.
Owen Hannaway, “Laboratory design and the aim of science: Andreas Libavius versus

Tycho Brahe” *Isis* 77 (1986): 585-610.

Week 4

September 22 — Artisans and knowledge

Francis Bacon, *New Atlantis*, edited by Jerry Weinberger, selections.

Deborah Harkness, *The Jewel House: Elizabethan London and the Scientific Revolution*, selections.

September 24 — New biological wonders

Robert Hooke, *Micrographia*, selections.

Andreas Vesalius, “Preface to *On the Fabric of the Human Body*,” trans. in *Proceedings of the Royal Society of Medicine*.

Lorraine Daston and Katherine Park, *Wonders and the Order of Nature*, selections.

Week 5

September 29 — The invention of experiment

Francis Bacon, *The New Organon*, in *The New Organon and Related Writings*, edited by Fulton H. Anderson (Indianapolis: Bobbs-Merrill, 1960), pp. 39-62.

Robert Boyle, *New Experiments Physico-Mechanicall, Touching the Spring of the Air* (Oxford: H. Hall, 1660), “To the reader” and “Experiment 1.”

Steven Shapin, “Pump and circumstance: Robert Boyle’s literary technology,” *Social Studies of Science* (1984).

October 1 — Newton and Newtonianism

Isaac Newton, *Mathematical Principles of Natural Philosophy*, trans. I. Bernard Cohen and Anne Whitman, selections.

Simon Schaffer, “Glass works: Newton’s prisms and the uses of experiment,” in *The Uses of Experiment*, ed. David Gooding, Trevor Pinch, and Simon Schaffer, 67-104.

Week 6

October 6 — Enlightenment reason

Descartes, René. 1978 [1637]. “Discourse on Method,” in *The Philosophical Works of Descartes*, trans. Elizabeth Haldane and G. R. T. Ross, vol. 1, 80-106.

Ian Hacking, *The Emergence of Probability: A Philosophical Study of Early Ideas about Probability, Induction, and Statistical Inference* (2006), selections.

October 8 — MIDTERM 1

3: Global Exchanges

Week 7

October 13 — The Atlantic World in the 17th century

Richard Ligon, *A True and Exact History of the Island of Barbadoes*.

Eric Otremba, "Inventing ingenios: experimental philosophy and the secret sugar-makers of the seventeenth-century Atlantic," *History and Technology* (2012).

October 15 — Networks of empire in the Enlightenment

Captain James Cook, *The Journals*, selections.

Simon Schaffer, "Newton on the Beach: The Information Order of *Principia Mathematica*," *History of Science* (2009).

Week 8

October 20 — Political, chemical, and metrical revolution

Antoine-Laurent Lavoisier, *Elements of Chemistry: In a New Systematic Order, Containing All the Modern Discoveries* (1789), trans. Robert Kerr (New York: Dover, 1965), "Preface of the author," xiii-xxxvii.

Lissa Roberts, "The Death of the Sensuous Chemist: The 'New' Chemistry and the Transformation of Sensuous Technology," *Studies in the History and Philosophy of Science* (1995).

Ken Alder, "A Revolution to Measure: The Political Economy of the Metric System in France," in *The Values of Precision*, ed. M. Norton Wise (1995).

October 22 — Botany and empire

Jim Endersby, "A Garden Enclosed: Botanical Barter in Sydney, 1818-39."

Charles Darwin, *The Voyage of the Beagle*, selections.

Janet Browne, *Darwin, Volume 1*, selections.

Week 9

October 27 — Evolution

Charles Darwin, *On the Origin of Species*, selections

Infinite Tropics: An Alfred Russel Wallace Anthology, selections.

Charles Lyell, selections.

October 29 — New audiences for science

Anne Secord, “Science in the Pub: Artisan Botanists in Early Nineteenth-Century Lancashire,” *History of Science* (1994).

Beau Riffenburgh, *The Myth of the Explorer: The Press, Sensationalism, and Geographical Discovery* (1994), selections.

Week 10

November 3 — Scientific labor and 19th-century industry

James Joule, “The mechanical equivalent of heat.”

Heinz Otto Sibum, “Reworking the Mechanical Value of Heat: Instruments of Precision and Gestures of Accuracy in Early Victorian England.”

Simon Schaffer, “Babbage’s Intelligence: Calculating Engines and the Factory System,” *Critical Inquiry* (2004).

November 5 — MIDTERM 2

4: The Power of Science

Week 11

November 10 — Physics of empire, empires of physics

Peter Galison, *Einstein’s Clocks, Poincaré’s Maps: Empires of Time* (2003), selections.

November 12 — Upending reality

Albert Einstein, “On the electrodynamics of moving bodies” (1905).

Paul Forman, “Weimar culture, causality, and quantum theory, 1918-1927,” in *Darwin to Einstein: Historical Studies on Science and Belief*, ed. Colin Chant and John Fauvel, selections.

Week 12

November 17 — Eugenics, Social Darwinism, and the other social sciences

Charles Darwin, *The Descent of Man*, selections.

Francis Galton, *Probability: The Foundation of Eugenics* (1907)

November 19 — Statistics, accountability, and the modern state

Michel Foucault, *Discipline and Punish: The Birth of the Prison*, selections.

William J. Ashworth, “‘System of Terror’: Samuel Bentham, Accountability and Dockyard Reform during the Napoleonic Wars,” *Social History* (1998).

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Week 13

November 24 — War and postwar

Vannevar Bush, “Science: The Endless Frontier.”

Michael Gordin, *Five Days in August: How World War II Became a Nuclear War* (2007), selections.

Stuart Leslie, *The Cold War and American Science*, selections.

November 26 — no class (Friday classes)

Week 14

December 1 — Lecture topic TBD

December 3 — The rise of bioscience in the 20th century

Robert Kohler, *Lords of the Fly: Drosophila Genetics and the Experimental Life* (selections)

5: Conclusion

Week 15: Who controls science and to what ends?

December 8 — Humans, animals, and the “environment”

Donna Haraway, *Primate Visions: Gender, Race, and Nature in the World of MODern Science* (1989), selections.

December 10 — Final discussion: global science, global warming
(Final paper due 9am)