

History of Science 203: Science in the Twentieth Century
Course Syllabus
Fall 2003

Now, history of science productions brings you an epic tale of struggle and triumph, war and peace, politics and power, full of cliffhangers and classic characters. A story a century in the making. Cue the stirring theme music and fade in on our hero—Science!

All overwrought cinematic ploys aside, welcome to HS 203. Over the next semester, we will be following the story of science, during the twentieth century. Like any good yarn, it will be teaming with a diverse collection of supporting characters, interesting locales, and relevant themes. The only thing we'll be missing in the soundtrack. But its plot that separates a story from a pile of information, and there's one here too about the intellectual and social "coming-of-age" of modern science, reaching a culmination in years after World War II.

Now, something about the narrator...that is, me.

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Outside of office hours, the best way to contact me is via e-mail. Expect about a 24-hour turn-around time on any message you send. If you need to talk to me immediately, feel free to call me at home. But please only call between 10am and 10pm. Calling at other times will result in much teeth-gnashing and despair. All papparazi will be sternly glared at on sight.

The format of this course involves two lectures and one discussion section a week. The latter is in the capable hands of Oscar Nominee* Matt Lavine. If tradition is any indication, Matt will likely be your primary contact over the next fifteen weeks. That does not mean, however that you should be at all bashful about talking with me about anything from the course material to who the next Bachelor should pick. Likewise, though the discussion section will provide you with a forum to express your ideas and questions, you shouldn't hesitate to bring up a concern or toss a query out during lecture.

Content

We'll begin our story with additions to the content of science prior to World War II. In discussing important developments in physics, biology, medical science, and social science in turn, we'll also introduce some innovations in practice and social/cultural arrangements. Relativity and quantum mechanics will highlight the rise of theoretical physics as a profession of its own. The spread of the germ theory of disease will suggest the growing importance of laboratory work. We'll end the first third of the course with a more focused look at the changes

* Not really. It's just a running gag if you haven't guessed.

in the social/cultural dimensions of science, particularly the means of support for scientific research and the establishment of science as a autonomous profession.

The second third of the course will continue with an examination of support for scientific work and its transformation by the two world wars into something often called “Big Science.” After an exploration of the Manhattan Project, we’ll briefly treat scientific work in Nazi Germany and Imperial Japan in the spirit of comparative study, then the aftermath of the bomb and popular images of post-war science in America. We’ll end this section of the course with the political establishment of science in what might be called the military-industrial-academic complex, and the changes in practice and perception that followed from this.

The final third of the course will take a step back and begin to examine our main character with a more critical eye. We’ll consider a series of issues regarding science that garnered the attention of historical actors and will hopefully engage you too. We’ll begin by trying to evaluate the political, economic, and social pressures around post-war science, and asking whether such pressures aided or inhibited scientific work. With a highly ambiguous view of science firmly in mind, we’ll continue on into the possible future by discussing technologies, largely made possible by the support system that emerged for science after mid-century, that are likely to make a serious impact in the coming decades and the hopes and fears surrounding them.

Themes

Within the context of our main story, we will trace several themes:

- Science has not only involved the work of geniuses or great thinkers. A wide variety of people have engaged in the study of nature or in activities that made such study possible.
- The study and control of nature has not only been about facts and theories, but also about social arrangements that made available financial support, educational credentials, research tools, and other resources.
- Science and politics have become increasingly intertwined during the twentieth century. In particular, war has played a central role in the establishment of modern science.

Objectives

This course is designed to help you accomplish a number of goals. These include:

- To gain a grasp of the basic ideas behind twentieth century science.
- To understand how and why the present social and cultural form of science emerged.
- To contextualize science, that is to learn how to see science of the past in its proper time and place and not judge it by modern standards.

Readings

Most of the readings for this course have all been gathered together in a single course reader, available at the **History of Science Department Office**, just upstairs in 7142 Social Science, for \$20. Be advised that there are **no refunds** on readers.

Within the course reader, you will find two sorts of readings. The first are “primary” sources – that is, documents from the time period we are talking about. You should use these to try to get a sense of how people thought in the past, how they wrote, what was important to them, and the like. You should notice that these primary sources become more familiar as we move toward the present.

The second kind of reading you will encounter is called a “secondary” source. This is a book or article written by someone after the period in questions. I encourage you not to accept these sources as the absolute truth, though you should not dismiss them without some reason. You should approach these readings in an open minded, but critical spirit. My lectures, by contrast, are absolutely true and accurate.

Grading

Your grade in the course will be based on several elements. You will be **assigned three take-home essay questions** throughout the next fifteen weeks. Their lengths and the percentage of your grade they represent will increase as the semester progresses (see below). The due dates for all the exams are noted on the lecture/reading schedule at the end of this syllabus. If you know of any **special arrangements** you need to make regarding the exams (for instance, if you know you will be out of town) you need to let Matt and me know as soon as possible, within the first week of class if you can. **We reserve the right not to accept late exams or to deduct points for lateness.** If you want help with any assignment, please talk to me or to Matt. You may also visit the Writing Center (6171 Helen C. White Hall, ph. 263-1992) or consult any of the writing guides in the campus libraries, such as Diane Hacker’s *A Pocket Style Manual*.

A portion of your grade will also be based on your performance in the **discussion section**. If you have any questions, please mercilessly pelt Matt with them.

A summary of the elements of your final grade (including the length of essays) is as follows:

Essay #1	20%
Essay #2	25%
Essay #3	30%
Discussion	25%

If any problems arise over the course of the next 8-weeks that might endanger your performance in the course, you need to let me know as soon as possible.

If you have any questions about a grade, you should talk to Matt first. If you and Matt aren’t able to work out a solution, you should talk to me. Be aware that while I am always open to talking about any concerns you have, I know that Matt is a earnest and conscientious grader and you will need to make one awfully good case for me to question his hard work. If we can’t come to an agreement, the next step is for you to speak with the HS Chair Greg Mitman. He will attempt to resolve the issue informally and inform you of the Appeals Procedures if no resolution is reached. This set of steps is in line with L&S policy and should be available to you in any course, not just this one.

One last note on a great and dreadful evil: **Plagiarism**. Plagiarism on any written assignment is unacceptable and grounds for automatic failure on the given assignment. If you use **3 or more words** in a row from another author, it **must** be placed in quotation marks and cited. Otherwise it is plagiarism. You should also cite ideas you use if you found them in the work of another author. If you have any questions, please see me, consult the folks at the Writing Center, or see one of the many writing guides in campus libraries. Penalties for plagiarism can range from having to redo an assignment to **failing the course**, so don't do it.

Schedule

Unit I: New Century, New Science

9/1 Introduction

9/3 New Physics: X-Rays, Radiation, and Atoms

Readings:

- Arthur Schuster, *The Progress of Science During 33 Years* (Cambridge: Cambridge University Press, 1911), pp. 73-75.
- Frederick Soddy, "Science on Road to Revolutionize All Existence," in *Science in the Twentieth Century*, ed. Walter Sullivan, (NY: Arno Press, 1975), pp. 5-7.
- David Cassidy, *Einstein and Our World* (Atlantic Heights, NJ: Humanities Press, 1995), pp. 7-17.

9/8 New Physics: Relativity

9/10 New Physics: Quantum Mechanics

Readings:

- David Cassidy, *Einstein and Our World* (Atlantic Heights, NJ: Humanities Press, 1995), pp. 24-59.
- "A Mystic Universe," in *Relativity Theory: Its Origins and Impact on Modern Thought* (NY: John Wiley & Sons, Inc., 1968), pp. 129-30.

9/15 New Biology: Heredity

9/17 New Biology: Evolutionary Synthesis

Readings:

- Diane Paul, *Controlling Human Heredity* (Atlantic Heights, NJ: Humanities Press, 1995), pp. 40-9 and 72-96.
- Julian Huxley *Evolution: The Modern Synthesis* (London: Harper & Bros, 1942), pp. 12-28.

9/22 New Medicine: Germs

9/24 New Psychology: Freudianism and Behaviorism

Readings:

- Nancy Tomes, *The Gospel of Germs* (Cambridge: Harvard University Press, 1998), pp. 157-182.
- John Watson, "What is Behaviorism?" *Harpers* 152 (1926): 723-9.
- H.W. Chase, "Freud's Theories of the Unconscious," *Popular Science* 78 (1911): 355-63.

9/29 New Patrons: Industry and Philanthropy
10/1 Science in World War I

Readings:

- Robert Rydell, "The Fan Dance of Science: American World's Fairs in the Great Depression," *Isis* 76 (1985): 525-42.
- Hugh Slotten, "Humane Chemistry or Scientific Barbarism? American Responses to World War I Poison Gas, 1915-1930," *Journal of American History* 77 (1990): 476-498.

Essay #1 due Wednesday, 10/8

World War and Big Science

10/6 [No class]

10/8 Science in World War II

Readings:

- Daniel Kevles, *The Physicists* (Cambridge: Harvard University Press, 1995), pp. 287-334.

10/13 Wartime Science, Politics, and Ideology: German Science

10/15 Wartime Science, Politics, and Ideology: Japanese Science

Readings:

- Alan Beyerchen, *Scientists Under Hitler* (New Haven: Yale University Press, 1977), pp. 168-98.
- Tessa Morris-Suzuki, *The Technological Transformation of Japan* (Cambridge: Cambridge University Press, 1994), 143-57.

10/20 The Bomb and its Aftermath

10/22 Post-War Popularization of Science

Readings:

- Paul Boyer, *By the Bomb's Early Light* (NY: Pantheon, 1985), 3-26.
- Bruce Lewenstein, "The Meaning of 'Public Understanding of Science' in the United States after World War II," *Public Understanding of Science* 1 (1992): 45-68.
- *The Public Impact of Science in the Mass Media* (Ann Arbor: 1958), 135-6, 159-60, 173, 180-1, and 186.

10/27 Post War Science and the National Science Foundation

10/29 Military-Industrial-University Complex

Readings:

- Vannevar Bush, *Science: The Endless Frontier* (Washington: US Government Printing Office, 1945), 10-12 and 31-40.
- Stuart Leslie, *The Cold War and American Science: The Military-Industrial-Academic Complex at MIT and Stanford* (NY: Columbia University Press, 1993), 14-43.

11/3 Big Science, Big Personalities: DNA

11/5 Big Science, Big Stakes: The Space Program

Readings:

- John D. Watson, *The Double Helix*, ed. Gunther Stent, (NY: Norton, 1980), pp. 9-31 and 87-115.
- Walter McDougal, *The Heavens and the Earth* (NY: Basic Books, 1985), 307-24.

Essay #2 due Wednesday, 11/12

Science: Friend or Foe?

11/10 Science and Politics

11/12 Science and Secrecy

Readings:

- Alfred K. Mann, *For Better or Worse: The Marriage of Science and Government in the United States* (NY: Columbia University Press, 2000), 131-50.
- Phil Patton, *Dreamland: Travels Inside the Secret World of Roswell and Area 51* (NY: Villard, 1998), 56-67.
- "Oppenheimer Loses His Appeal to AEC, 4 to 1," and "If Einstein Were Young, He Says, He'd Become a Plumber," in *Science in the Twentieth Century*, ed. Walter Sullivan, (NY: Arno Press, 1975), pp. 356-8.

11/17 Science and the '60s

11/19 Science and Humanism

Readings:

- Rachel Carson, *Silent Spring* (Greenwich, CN: Fawcett, 1962), 5-13.
- Stuart Leslie, *The Cold War and American Science: The Military-Industrial-Academic Complex at MIT and Stanford* (NY: Columbia University Press, 1993), 231-56.
- Ullica Sagerstale, "Science and Science Studies: Enemies or Allies," in *Beyond the Science Wars*, ed. Ullica Sagerstale (Albany: State University of New York Press, 2000), 1-25.

11/24 Science and Religion

11/26 Fun and Games

Readings:

- Maynard Shipley, *The War Against Modern Science* (NY: A.A. Knopf, 1927), 3-6 and 376-85.
- James Gilbert, *Redeeming Culture* (Chicago: University of Chicago Press, 1997), 199-223.

12/1 Science and the Mind

12/3 Science and the End of the World

Readings:

- Eric Drexler, *Engines of Creation* (Garden City, NY: Anchor Press, 1986), 3-20 and 99-116.

- Bill Joy, "Why the Future Doesn't Need Us," *Wired* 8 (2000): 238-40, 242-4, 246, 248, 250, 254, 256, 258, and 262.

12/8 Science and Globalization

12/10 Conclusion

Readings:

- Claude Alvares, "Does the Real World Need 'Modern' Science?" in *Science for the Earth* (Chichester, NY: John Wiley, 1995), 65-86.
- "World Society and Science Globalization," in *Science in the Modern World Polity*, Gili S. Dori, John W. Meyer, Francisco O. Ramirez, and Evan Schofer (Stanford: Stanford University Press, 2003), pp. 293-308.
- Daniel Sarewitz, "Human Well-Being and Federal Science," in *Science, Technology, and Democracy*, ed. Daniel Lee Kleinman (Albany: State University of New York Press, 2000), pp. 87-102.

Final Essay due Tuesday, 12/16

Thomas Broman

Fall Semester Office Hours: Thursday 10:00 a.m. – 12:00 p.m.

Call 3-1562 or email thbroman@wisc.edu for an appointment