

History of Science 222, Spring 2012
Technology and Social Change in History
11:00-11:50 MW, 5231 Social Science

Sections: **301**: Th1:20-2:10, 4020 Vilas; **302**: Th2:25-3:15, 4020 Vilas;
303: Th3:30-4:20, 4020 Vilas; **304**: We3:30- 4:20, 6322 Social Science

Professor: Eric Schatzberg	Office hours: 2:00-3:00 Mon. or by appt.
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Description

The course presents a series of topics dealing with key ideas about technology. These topics draw on historical examples, focusing on episodes from the past that illuminate the nature of technological change and the relationship between technology and other human endeavors. Much of the material in this course will challenge widely held misperceptions about what technology is and how it operates in the modern world. In particular, I argue that technology is a human product, not an autonomous force. Technology makes nothing happen by itself, but only as the result of human action. We can, therefore, only make sense of technology by understanding it as an integral part of human history.

There are three major parts to the course. The first part focuses on the factors that shape technological change. The second part examines technology in relation to society and culture, treating issues of gender, work, and war. The third part concentrates on ethics of technology, with case studies on petroleum, automobile safety, and the shuttle *Challenger*.

Requirements

Discussion. Section meetings will be devoted to discussion. Please come prepared to talk. Preparation will require doing the readings for the week and thinking about the discussion questions distributed by email.

Weekly assessments. Most section meetings will include a brief assignment or a quiz based on the week's readings and lectures. These exercises will help you prepare for discussion and keep up with the readings. See the separate discussion section syllabus for details.

Take-home essays. There will be two short take-home essay exams during the semester (due 2/27 and 4/9) and a take-home final (due 5/18).

Grades

Take-home essays, 50%; weekly assignments and quizzes, 25%; discussion, 25%. Grading is on a 4-point scale, with A=4, AB=3.5, B=3, BC=2.5, C=2, D=1, F=0. Boundaries between grades fall at the numeric midpoints.

The *discussion* grade will be based on section attendance and class participation. Ideally, everyone should try to make one or two meaningful comments in each section meeting.

The *essays* will be graded on both writing and content. In order to receive an A, the essay must have the following: 1) a clearly stated thesis making a non-trivial point in response to the questions posed; 2) properly focused paragraphs each contributing to the thesis; 3) specific evidence, drawn from the readings, supporting the thesis; 4) direct, concise prose that conveys your meaning with specific, carefully chosen words; 5) correct spelling, grammar, and punctuation.

Course Web Site and Email List

The website for this course is <https://chatter.lss.wisc.edu/moodle/course/view.php?id=197>.

There will also be a link to this site through Learn@UW.

In addition, we will use the class email list to communicate with students. The email address is histsci222-1-s12@lists.wisc.edu.

Course Books and Reader:

The following books will be available at Rainbow Bookstore Cooperative, 426 West Gilman Street (off State St.), 257-6050, open 10-8 Mon-Thu, 10-6 Fri-Sat, 12-5 Sun. (Please support your local independent bookstores.)

Virginia Scharff, *Taking the Wheel: Women and the Coming of the Motor Age* (Albuquerque: University of New Mexico Press, 1991).

Richard P. Feynman, *"What Do You Care What Other People Think?"* (New York: Bantam, 1988).

A course reader with other assigned readings is available from the Social Science Copy Center, 6120 Social Science (M-F 7:45am-11:45am, 12:30pm-4:00pm). Ask for reader #12. The price is \$23.10; payment is by cash, check or WiscCard (no credit cards). All readings will also be on reserve at College Library.

How to Read (in history courses)

History courses have a lot of reading, and this course is no exception. When approaching historical readings, especially longer ones, you need to keep specific questions in mind to help you focus on the relevant details. Use the weekly email for guidance.

Academic Integrity and Plagiarism

Each student is responsible for knowing the rules about academic misconduct, that is, what counts as cheating. See <http://www.wisc.edu/students/saja/misconduct/UWS14.html>.

For this course, the most important rules concern written work done outside of class. Here's a quick summary. Don't copy stuff without 1) citing the original source you used for the ideas, and 2) putting it in quotation marks if you use the exact words. For more details, see <http://www.wisc.edu/writing/Handbook/QuotingSources.html>.

You can study and discuss things with your classmates and friends, but your writing must be your own. Once you start writing, stop talking with classmates. You can, however, ask friends outside the class to check your written work for clarity and grammar.

Religious Holidays and ADA Notice

You can take off any religious holidays you want, as long as you make up the work. If necessary, we'll give observant students an alternative but equivalent assignment. Please let me or Stephen know in advance which days you will miss. For more detail see: <http://www.secfac.wisc.edu/governance/ReligiousObservancesMemo.htm>.

If you have a disability that might affect your performance in this course, do not hesitate to let me know; I'll do my best to accommodate you. For more information, contact the McBurney Disability Resource Center, 263-2741.

Freaking Out:

College life often involves a lot of stress. If you feel like things are getting out of hand, either for personal or academic reasons, please contact the Counseling and Consultation Service, part of the University Health Service, 333 East Campus Mall, 265-5600. For more information, see http://www.uhs.wisc.edu/home.jsp?cat_id=36.

Course Outline

Part 1: Understanding Technological Change

Week 1 (Jan. 23, 25) Introduction - Thinking Differently About Technology

Outline of course; definitions of technology; technological determinism.

Reading: Winner, "Prophets of Inevitability" (1998), 1-2;
"Exxon Mobil Meets Amazon.com," *Business Week* (1998), 178.

Assignment: Complete the two short readings for section. Copies are available on the course web page, in case you don't have time to pick up the course reader.

Week 2 (Jan. 30, Feb. 1) Invention as a Process

Invention and creativity; Edison's electric light and power system.

Reading: Hughes, "How Did the Heroic Inventors Do It?" (1985), 18-25;
Hughes, "Edison the Hedgehog: Invention and Development" (1983), 18-45.

Week 3 (Feb. 6, 8) Development, Innovation, and Failure

The difficult and often unsuccessful path from concept to use.

Reading: Adams, *Flying Buttresses, Entropy, And O-Rings* (1993), 151-68;
Leslie, "Charles F. Kettering and the Copper-Cooled Engine" (1991), 283-307.

Week 4 (Feb. 13, 15) Science and Technological Change

The invention of the steam engine as a case study.

Reading: Cardwell, *Turning Points in Western Technology* (1972), 51-59, 66-72;
Lindqvist, *Technology on Trial* (1984), 108-17;
Mayr, "The Science-Technology Relationship as a Historiographic Problem" (1976), 663-73.

Week 5 (Feb. 20, 22) Markets and the Economics of Innovation

Systems, markets, the QWERTY keyboard, and Microsoft.

Reading: Chang, "There is No Such Thing As a Free Market" (2010), 1-10;
Arthur, "Positive Feedbacks in the Economy" (1994), 1-12;
David, "Understanding the Economics of QWERTY: The Necessity of History" (1986), 30-49.

Assignment: First take-home essay due Monday, 2/27.

Part 2: Technology, Society, and Culture

Week 6 (Feb. 27, 29) Technology, War, and the Military

Military roots of key modern technologies; computers as a case study.

Reading: Edgerton, "War," chap. 6 in *Shock of the Old* (2007), 138-15;
Misa, "The Means of Destruction, 1936-1990" (2004), 190-224.

Week 7 (Mar. 5, 7) Technology and Gender 1: Women Drivers

Gender roles and the early automobile.

Reading: Scharff, *Taking the Wheel*, 1-88 (chaps. 1-5).

Week 8 (Mar. 12, 14) Technology and Gender 2: Technologies of Consumption

How gender shapes technology. Video Monday, *America on Wheels*.

Reading: Scharff, *Taking the Wheel*, 89-175 (chaps. 6-9).

Week 9 (Mar. 19, 21) Technology, Production and Work, 1

Managers, workers, and mass production.

Reading: Shaiken, "The Machine Shop" (1986), 16-44;
Peterson, "Auto Work" (1987), 30-45;
Henry Ford, "The Terror of the Machine" (1922), 103-111.

Week 10 (Mar. 26, 28) Technology, Production and Work, 2

Skill, automation, and technological choice in the workplace.

Reading: Shaiken, "Criteria of Design" (1986), 45-65;
Thomas, "Technology as a Power Tool" (1994), 41-87.

Assignment: second take-home essay due Monday, 4/9 (after spring break).

Spring Break

Part 3: Ethical Dimensions of Technology

Week 11 (Apr. 9, 11) Automobiles, Oil Imports, and National Security

International implications of American dependence on petroleum.

Reading: Klare, "Oil, Geography and War" (2001), 27-50;
Smil, "America's Oil Imports: A Self-Inflicted Burden" (2011), 712-716;
Taylor and Doren, "The Energy Security Obsession" (2008), 475-485.

Week 12 (Apr. 16, 18) Automobiles, Engineers and Corporate Responsibility

The Chevrolet Corvair and its implications for engineering ethics.

Reading: Nader, *Unsafe at Any Speed* (1965), vii-x, 1-32, 138-170.

Week 13 (Apr. 23, 25) The Shuttle Challenger Disaster, 1

From Sputnik to the Shuttle program.

Reading: DeGroot, *The Dark Side of the Moon* (2006), 45-78, 121-52 (chaps. 4-5, 8);
Roland, "The Shuttle: Triumph or Turkey" (1985), 29-49.

Week 14 (Apr. 30, May 2) The Challenger Disaster, 2

A study in engineering ethics.

Reading: Boisjoly, Curtis, and Mellican, "Roger Boisjoly and the Challenger Disaster" (1989), 217-30;

Feynman, "What Do You Care What Other People Think?," 114-247.

Week 15 (May 7, 9) Technological Determinism, Revisited

A look at one of the leading advocates of a determinist understanding of technology, and one of his critics.

Reading: Kelly, "Understanding Technological Evolution and Diversity" (2011), 44-48;
Morozov, "e-Salvation" (2011), 28-31.

Final Essay Due - Friday, May 18, noon

Third take-home essay due at noon in the History of Science TA office, 316 Bradley Memorial.

Course Reader Contents

1. Langdon Winner, "Prophets of Inevitability," *MIT's Technology Review* 101 (Mar/Apr 1998): 62.
2. "Exxon Mobil Meets Amazon.com," *Business Week*, 14 Dec. 1998, 178; reprinted in *New York Times*, 5 Dec. 1998, A13.
3. Thomas P. Hughes, "How Did the Heroic Inventors Do It?" *American Heritage of Invention and Technology* 1, no. 2 (Fall 1985): 18-25.
4. Thomas P. Hughes, "Edison the Hedgehog: Invention and Development," chap. 2 in *Networks of Power: Electrification in Western Society, 1880-1930* (Baltimore: Johns Hopkins University Press, 1983), 18-46.
5. James L. Adams, *Flying Buttresses, Entropy, And O-Rings: The World of an Engineer* (Cambridge: Harvard University Press, 1993), 150-168.
6. Stuart W. Leslie, "Charles F. Kettering and the Copper-Cooled Engine," in *The Engineer in America*, ed. Terry S. Reynolds (Chicago: University of Chicago Press, 1991), 283-307.
7. D. S. L. Cardwell, *Turning Points in Western Technology* (New York: Science History, 1972), 51-59, 66-72.
8. Svante Lindqvist, *Technology on Trial: The Introduction of Steam Power Technology into Sweden, 1715-1736* (Stockholm: Almqvist & Wiksell, 1984), 108-17.
9. Otto Mayr, "The Science-Technology Relationship as a Historiographic Problem," *Technology and Culture* 17 (1976): 663-673.
10. Ha-Joon Chang, "There is No Such Thing As a Free Market," chap. 1 in *Twenty-Three Things They Don't Tell You About Capitalism* (New York: Bloomsbury Press, 2010), 1-10.
11. W. Brian Arthur, chap. 1 in "Positive Feedbacks in the Economy," *Increasing Returns and Path Dependence in the Economy* (Ann Arbor: University of Michigan Press, 1994), 1-12.

12. Paul A. David, "Understanding the Economics of QWERTY: The Necessity of History," in *Economic History and the Modern Economist*, ed. William N. Parker (Oxford: Basil Blackwell, 1986), 30-49.
13. David Edgerton, "War," chap. 6 in *Shock of the Old* (Oxford: Oxford University Press, 2007), 138-159.
14. Thomas J. Misa, "The Means of Destruction, 1936-1990," chap. 7 in *Leonardo to the Internet: Technology and Culture from the Renaissance to the Present* (Baltimore: Johns Hopkins University Press, 2004), 190-224.
15. Harley Shaiken, "The Machine Shop," chap. 2 in *Work Transformed: Automation and Labor in the Computer Age* (Lexington, Mass.: Lexington Books, 1986), 16-44, 279-281.
16. Joyce Shaw Peterson, "Auto Work," chap. 3 in *American Automobile Workers, 1900-1933* (Albany: State University of New York Press, 1987), 30-45.
17. Henry Ford, selection from "The Terror of the Machine," chap. 7 in *My Life and Work* (Garden City, NY: Doubleday, Page, 1922), 103-111.
18. Harley Shaiken, "Criteria of Design," chap. 3 in *Work Transformed: Automation and Labor in the Computer Age* (Lexington, Mass.: Lexington Books, 1986), 45-65, 281-283.
19. Robert J. Thomas, "Technology as a Power Tool: Technological Choice in an Aircraft Company," chap. 2 in *What Machines Can't Do: Politics and Technology in the Industrial Enterprise* (Berkeley: University of California Press, 1994), 41-87.
20. Ralph Nader, *Unsafe at Any Speed: The Designed-In Dangers of the American Automobile* (New York: Grossman, 1965), vii-x, 1-32, 138-170 (Introduction, chaps. 1, 5).
21. Michael T. Klare, "Oil, Geography and War," chap. 2 in *Resource Wars: The New Landscape of Global Conflict* (New York: Metropolitan Books, 2001), 27-50.
22. Vaclav Smil, "America's Oil Imports: A Self-Inflicted Burden," *Annals of the Association of American Geographers* 101 (2011): 712-716.
23. Jerry Taylor and Peter van Doren, "The Energy Security Obsession," *Georgetown Journal of Law & Public Policy* 6 (2008): 475-485.
24. Gerard J. DeGroot, *The Dark Side of the Moon* (New York: New York University Press, 2006), 45-78, 121-52 (chaps. 4-5, 8).
25. Alex Roland, "The Shuttle: Triumph or Turkey?" *Discover*, Nov. 1985, 29-49.
26. Russel P. Boisjoly, Ellen F. Curtis, and Eugene Mellican, "Roger Boisjoly and the Challenger Disaster," *Journal of Business Ethics* 8 (1989): 217-30.
27. Kevin Kelly, "Understanding Technological Evolution and Diversity," *Futurist* 45 (March/April 2011): 44-48.
28. Evgeny Morozov, "e-Salvation," *New Republic* 242 (March 24, 2011): 28-31.