

History of Science 222, Spring 2009
Technology and Social Change in History

11:00-11:50 MWF, 4308 Social Science

Professor:	Eric Schatzberg	Office Hrs:	2:30-3:30 Tue. or by appt.
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Description:

Why has *technology* become such a powerful idea at the beginning the 21st century? Why do people invest so many hopes and fears in this concept? Why are governments willing to invest billions to promote some technologies but not others?

This course attempts to challenge widely held beliefs about technology, to cut through the common misperceptions that prevent most Americans from having a clear understanding of what technology is and how it operates in the modern world. The course uses history to achieve this goal, focusing on episodes from the past that illuminate the nature of technological change and the relationship between technology and other human endeavors.

There are three majors parts to the course. The first part focuses on the factors that shape technological change. The second part examines the technology in relation to society and culture, examining issues of gender, work, war, and international politics. The third part focuses on ethics and enthusiasm, using automobile safety, the space shuttle *Challenger* disaster, and aluminum as case studies.

Requirements:

Discussion. Most Fridays 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. On most Fridays, there will be 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.

Take-home essays. There will be two short take-home essay exams during the semester (due 2/23 and 4/6) and a take-home final (due 5/12).

Grades

Take-home essays, 50%; weekly assignments and quizzes, 30%; discussion, 20%. 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 attendance and class participation, particularly during the Friday discussion. I would like to see one or two halfway intelligent comments from every member of the class in each discussion period.

The *essays* will be graded roughly equally on 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) generally correct spelling, grammar and punctuation.

Email List:

I will use the class email list often, especially for sending out assignments. Students should feel free to contribute to the list as well, but please limit postings to messages directly relevant to the course. The list address is histsci222-1-s09@lists.wisc.edu.

Course Books and Packet:

The following books will be available the Rainbow Bookstore Cooperative, 426 West Gilman Street (off State St.), 257-6050, open 10-6 MWFSa, 10-8 TuTh, 12-5 Su. (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 packet of other assigned readings is available for purchase are available for purchase from the Social Science Copy Center, 6120 Social Science (262-5396).

All readings will 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. To this end, I will email a brief introduction highlighting the key ideas in each week's readings.

Academic Integrity and Plagiarism:

Each student is responsible for knowing the rules about academic misconduct, that is, what counts as cheating. A good overview is here:

<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. I try to avoid scheduling major assignments on the more popular religious holidays. If necessary, I'll give observant students an alternative but equivalent assignment.

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, 905 University Avenue, 265-5600. For more information, see <http://www.uhs.wisc.edu/>; click on "Counseling Services" on the left side of the page.

Course Outline

Part 1: Understanding Technical Change

Week 1 (Jan. 21, 23) Introduction - Thinking Differently About Technology

Outline of course; definitions of technology; technological determinism.

Reading: David Edgerton, *Shock of the Old*, ix-xviii, 1-27 (Introduction, chap. 1).

Assignment: Prepare for discussion of Edgerton reading on **Monday 1/26**.

Week 2 (Jan. 26, 28, 30) Invention as a Process

Invention and creativity; the telegraph as a case study.

Reading: Brooke Hindle, *Emulation and Invention*, 85-142.

Week 3 (Feb. 2, 4, 6) Development, Innovation, and Failure

The difficult and often unsuccessful path from concept to use.

Reading: James L. Adams, *Flying Buttresses, Entropy, And O-Rings*, 151-68;
Stuart W. Leslie, "Charles F. Kettering and the Copper-Cooled Engine," 283-307.

Week 4 (Feb. 9, 11, 13) Science and Technological Change

The invention of the steam engine as a case study.

Reading: D. S. L. Cardwell, *Turning Points in Western Technology*, 51-59, 66-72;
L. T. C. Rolt, *Thomas Newcomen*, 9-15, 30-41;
Svante Lindqvist, *Technology on Trial*, 108-17.

Week 5 (Feb. 16, 18, 20) Markets and the Economics of Innovation

Systems, markets, the QWERTY keyboard, and Microsoft.

Reading: Robert Kuttner, "The Limits of Markets," 28-36;
W. Brian Arthur, "Positive Feedbacks in the Economy," 92-95, 98-99;
Paul David, "Understanding the Economics of QWERTY: The Necessity of History," 30-49.

Assignment: First take-home essay due Monday, 2/23.

Part 2: Technology, Society, and Culture

Week 6 (Feb. 23, 25, 27) Technology, War, and the Military

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

Reading: David Edgerton, "War," chap. 6 in *Shock of the Old*, 138-159.
Paul Edwards, "Why Build Computers: The Military Role in Computer Research," 42-73;

Week 7 (Mar. 2, 4, 6) 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. 9, 11, 13) Technology and Gender 2: Technologies of Consumption

Gender shaping technology.

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

Spring Break

Week 9 (Mar. 23, 25, 27) Technology, Production and Work, 1

Managers, workers, and control of the labor process.

Reading: Carroll Pursell, "Makes No Sense," chap. 4 in *White Heat*, 93-117;
Harry Braverman, "Scientific Management," 85-123;
Joyce Shaw Peterson, "Auto Work," 30-45;
Henry Ford, "The Terror of the Machine," 103-111.

Week 10 (Mar. 30, Apr. 1, 3) Technology, Production and Work, 2

Skill, automation, and technological choice.

Reading: Harley Shaiken, *Work Transformed: Automation and Labor in the Computer Age*, 16-65 (chaps. 2, 3);
Robert J. Thomas, "Technology as a Power Tool," 41-87.

Assignment: second take-home essay due Monday, 4/6.

Part 3: Engineering Ethics and Technological Enthusiasm

Week 11 (Apr. 6, 8, 10) Automobiles, Engineers and Corporate Responsibility

Ralph Nader's critique of auto safety.

Reading: Edwin T. Layton, "The Engineer and Business, chap. 1 in *The Revolt of the Engineers*, 1-24;
Ralph Nader, *Unsafe at Any Speed*, 138-188 (chaps. 5, 6).

Week 12 (Apr. 13, 15, 17) Technology and politics: From the Suburbs to 9/11

International implications of American dependence on petroleum. No quiz Friday.

Readings: Michael T. Klare, "Oil, Geography and War," 27-50;
Michael T. Klare, "The Geopolitics of War," 11-15;
Barbara Conry, "Time Bomb: The Escalation of U.S. Security Commitments in the Persian Gulf Region," Cato Policy Analysis No. 258 (Aug. 29, 1996).

Week 13 (Apr. 20, 22, 24) The Shuttle Challenger Disaster, 1

From Sputnik to the Shuttle program.

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

Week 14 (Apr. 27, 29, May 1) The Challenger Disaster, 2

A study in engineering ethics. Reading response.

Reading: Russel P. Boisjoly, Ellen F. Curtis, and Eugene Mellican, "Roger Boisjoly and the Challenger Disaster," 217-30;

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

Week 15 (May 4, 6, 8) Technological Enthusiasm Revisited: The Case for Technorealism

Puncturing the bubble of enthusiasm; aluminum as an example.

Reading: Eric Schatzberg, "Symbolic Culture and Technological Change: The Cultural History of Aluminum as an Industrial Material," 226-271;

Langdon Winner, "Prophets of Inevitability," *MIT's Technology Review* 101 (Mar/Apr 1998): 62.

Tuesday, May 12, 11:00 am - Final Essay Due

Third take-home essay due, 7129 Social Science at 11:00 am.

Course Packet Contents

1. David Edgerton, *Shock of the Old* (Oxford: Oxford University Press, 2007), ix-xviii, 1-27 (Introduction, chap. 1).
2. Brooke Hindle, *Emulation and Invention* (New York: Norton, 1981), 85-142, 149-153.
3. James L. Adams, *Flying Buttresses, Entropy, And O-Rings: The World of an Engineer* (Cambridge: Harvard University Press, 1993), 150-168.
4. 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.
5. D. S. L. Cardwell, *Turning Points in Western Technology* (New York: Science History, 1972), 51-59, 66-72.
6. L. T. C. Rolt, *Thomas Newcomen: The Prehistory of the Steam Engine* (Dawlish [Eng.]: David and Charles, 1963), 9-15, 30-41.
7. Svante Lindqvist, *Technology on Trial: The Introduction of Steam Power Technology into Sweden, 1715-1736* (Stockholm: Almqvist & Wiksell, 1984), 108-17.
8. Robert Kuttner, "The Limits of Markets," *The American Prospect* no. 31 (March-April 1997): 28-36.
9. W. Brian Arthur, "Positive Feedbacks in the Economy," *Scientific American* 292 (Feb. 1990): 92-95, 98-99.
10. 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.

11. David Edgerton, "War," chap. 6 in *Shock of the Old*, 138-159.
12. Paul Edwards, "Why Build Computers: The Military Role in Computer Research," chap 2 in *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge: MIT Press, 1996), 42-73.
13. Carroll Pursell, "Makes No Sense," chap. 4 in *White Heat* (Berkeley: University of California Press, 1994), 93-117.
14. Harry Braverman, "Scientific Management," chap. 4 in *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century*, 25th anniversary ed. (New York: Monthly Review Press, 1998), 59-85.
15. Joyce Shaw Peterson, "Auto Work," chap. 3 in *American Automobile Workers, 1900-1933* (Albany: State University of New York Press, 1987), 30-45.
16. Henry Ford, "The Terror of the Machine," chap. 7 in *My Life and Work* (Garden City, NY: Doubleday, Page, 1922), 103-111.
17. Harley Shaiken, *Work Transformed: Automation and Labor in the Computer Age* (Lexington, Mass.: Lexington Books, 1986), 16-65, 279-283 (chaps. 2, 3).
18. 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.
19. Edwin T. Layton, *The Revolt of the Engineers: Social Responsibility and the American Engineering Profession* (Baltimore: Johns Hopkins University Press, 1986), 1-24.
20. Ralph Nader, *Unsafe at Any Speed: The Designed-In Dangers of the American Automobile* (New York: Grossman, 1965), 138-188 (chaps. 5, 6).
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. Michael T. Klare, "The Geopolitics of War," *The Nation* 273 (Nov. 5, 2001), 11-15.
23. Barbara Conry, "Time Bomb: The Escalation of U.S. Security Commitments in the Persian Gulf Region," Cato Policy Analysis No. 258 (Aug. 29, 1996), http://www.cato.org/pub_display.php?pub_id=1117.
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. Eric Schatzberg, "Symbolic Culture and Technological Change: The Cultural History of Aluminum as an Industrial Material," *Enterprise and Society* 4 (2003): 226-271.
28. Langdon Winner, "Prophets of Inevitability," *MIT's Technology Review* 101 (Mar/Apr 1998): 62.