

History of Science 222, Spring 1999
Technology and Social Change in History

9:55-10:45 MWF, 104 Van Hise

Professor:	Eric Schatzberg	Office Hrs:	2-3 Wed. or by appt.
Office:	7129 Social Science	Telephone:	262-3973
		Email:	eschatzb@facstaff.wisc.edu

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 strange concept? Because of technology, companies that have never turned a profit see their stock valuations rise into the billions. Because of technology, millions fear the effects of global warming and genetically-modified foods.

This course attempts to demystify technology, to cut through the common misperceptions that prevent most Americans from having a clear understanding of technology. The course uses history to achieve this goal, focusing on a series of episodes from the past that illuminate the nature of technological change and the relationship between technology and other forms of human endeavor.

There are three majors parts to the course. The first part focuses on the factors that shape technological change. The second part examines the social side of technology in relation to gender, work, and corporate responsibility. The third part focuses on social and ethical concerns, using the *Challenger* disaster and enthusiasm for computers as case studies.

Requirements:

Discussion. Friday's class will be devoted to discussion. Attendance *and participation* count toward the discussion grade; try to make at least one contribution in each discussion.

Quizzes. On most Fridays, there will be a brief quiz based on the week's readings and lectures. These quizzes are designed to encourage preparation for the discussion.

Reading responses. On some Fridays, students will hand in brief, informal comments on the readings based on questions I will distribute by email. These comments should be no more than one single-spaced typed page.

Take-home essays. There will be three short take-home essay exams during the semester. These assignments will be graded on both content and writing.

Email Classlist:

I have set up an email list for this course at "histsci-222@lists.students.wisc.edu"; anything mailed to the list will be distributed to everyone registered for the class. I will use email mainly to send out assignments. Students are encouraged to contribute to the list as well, in particular by commenting on the readings or the discussion. Such postings will count toward your discussion grade.

Grades

Take-home essays, 60%; quizzes and reading responses, 20%; discussion, 20%. Students will do well in this course by reading carefully, paying attention to the lectures, thinking critically about the ideas presented in the course, and participating in discussion.

Course Books and Packet:

The following books will be available at Canterbury Booksellers, 315 W. Gorham Street, 258-9911. (Note: Canterbury is normally closed Mondays, but will be open Monday 1/24, 11am-6pm to accomodate the first day of classes.)

Carroll Pursell, *White Heat: People and Technology* (Berkeley: University of California Press, 1994);

Ruth Schwartz Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (New York: Basic Books, 1985);

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 from the History of Science department office, 7143 Social Science (262-1406). Normal office hours are 8-3, but call first if you are making a special trip.

All readings will be on reserve at College Library.

Course Outline

Part 1: Understanding Technical Change

Week 1 (1/24, 1/26, 1/28) Introduction - The Fallacy of Technological Determinism
Outline of course; definitions of technology; technological determinism.

Reading: Pursell, *White Heat*, 13-35 (chap. 1).

Assignment (due Friday): write a one-paragraph response to the Pursell reading.

Week 2 (1/31, 2/2, 2/4) Invention as a Social process
Invention and creativity; the telegraph as a case study. Quiz.

Reading: Pursell, *White Heat*, 37-63 (chap 2);
Brooke Hindle, *Emulation and Invention*, 85-142.

Week 3 (2/7, 2/9, 2/11) Development and Innovation
From concept to market. Quiz.

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 (2/14, 2/16, 2/18) Science and Technological Change

The invention of the steam engine as a case study. Reading response.

Reading: Pursell, *White Heat*, 119-43 (chap 5);

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 (2/21, 2/23, 2/26) Technology, Systems, and the Economics of Innovation

Systems, markets, the QWERTY keyboard, AC/DC, and Microsoft. Quiz.

Reading: John Cassidy, "The Force of an Idea," 32-37;

Paul A. David, "Understanding the Economics of QWERTY: The Necessity of History," 30-49;

Paul A. David and Julie Ann Bunn, "Gateway Technologies and the Evolutionary Dynamics of Network Industries: Lessons from Electricity Supply History," 121-56.

Week 6 (2/28, 3/1, 3/3) The Military as an Agent of Technological Change

Military R&D and the development of the metal airplane. Quiz.

Reading: Pursell, *White Heat*, 145-67 (chap 6);

Eric Schatzberg, "An Old Role for the Military," 64-95.

Assignment: First take-home essay exam (due Monday, 3/6).

Part 2: Technology and Society

Week 7 (3/6 3/8, 3/10) Technology, Production and Work, 1

Managers, workers, and control of the labor process. Reading response.

Reading: Pursell, *White Heat*, 93-117 (chap 4);

Harry Braverman, "Scientific Management," 85-123;

Joyce Shaw Peterson, "Auto Work," 30-45;

Henry Ford, "The Terror of the Machine," 103-111.

Spring Break

Week 8 (3/20, 3/22, 3/24) Technology, Production and Work, 2

Labor and technological choice in manufacturing. Quiz.

Reading: David F. Noble, "Social Choice in Machine Design: The Case of Automatically Controlled Machine Tools," 161-76;

Robert J. Thomas, "Technology as a Power Tool," 41-87.

Week 9 (3/27, 3/29, 3/31) Technology and Gender 1: Who Does the Dishes?

The industrialization of housework. Quiz.

Reading: Cowan, *More Work for Mother*, 3-102 (chaps. 1-4).

Week 10 (4/3, 4/5, 4/7) Technology and Gender 2

Failed alternatives and the dominance of the postwar suburbs. Reading response.

Reading: Cowan, *More Work for Mother*, 102-219 (rest of book).

Week 11 (4/10, 4/12, 4/14) Engineers and Corporate Responsibility

Ralph Nader's critique of auto safety. Quiz.

Reading: Ralph Nader, *Unsafe at Any Speed*, 3-41, 170-209 (chaps. 1, 5).

Assignment: Second take-home essay exam (due Monday, 4/12).

Part 3: Engineering Disasters, Computers, and the Future

Week 12 (4/17, 4/19, 4/21) The Shuttle Challenger Disaster, 1

From Sputnik to the Shuttle program. Quiz.

Reading: John M. Logsdon, "The Space Shuttle Program: A Policy Failure?" 1099-1105;

Alex Roland, "The Shuttle: Triumph or Turkey," 29-49.

Week 13 (4/24, 4/26, 4/28) 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 14 (5/1, 5/3, 5/5) Computers 1: Military Origins

The origins of digital computers and the Internet. Quiz.

Reading: Paul Edwards, "Why Build Computers: The Military Role in Computer Research," 42-73;

Janet Abbate, "White Heat and Cold War: The Origins and Meanings of Packet Switching," 7-41.

Week 15 (5/8, 5/10) Computers 2: Hope and Hype

Contrasting views on digital technology. Quiz Wednesday.

Reading: Paul A. Strassmann, "Will Big Spending on Computers Guarantee Profitability?" 75-85;

Esther Dyson, George Gilder, George Keyworth and Alvin Toffler, "Cyberspace and the American Dream: A Magna Carta for the Knowledge Age," Aug. 22, 1994;

Langdon Winner, "Technology Today: Utopia or Dystopia," 989-1017.

Monday, May 15 - Final Essay Due

Third take-home essay due, 7129 Social Science at 2:00 pm.

Course Packet Contents

1. Brooke Hindle, *Emulation and Invention* (New York: Norton, 1981), 85-142, 149-53.
2. James L. Adams, *Flying Buttresses, Entropy, And O-Rings: The World of an Engineer* (Cambridge: Harvard University Press, 1993), 151-68.
3. 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.
4. D. S. L. Cardwell, *Turning Points in Western Technology* (New York: Science History, 1972), 51-59, 66-72.
5. L. T. C. Rolt, *Thomas Newcomen: The Prehistory of the Steam Engine* (Dawlish [Eng.]: David and Charles, 1963), 9-15, 30-41.
6. Svante Lindqvist, *Technology on Trial: The Introduction of Steam Power Technology into Sweden, 1715-1736* (Stockholm: Almqvist & Wiksell, 1984), 108-17.
7. John Cassidy, "The Force of an Idea," *New Yorker* 73 (12 Jan. 1998): 32-37.
8. 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.
9. Paul A. David and Julie Ann Bunn, "Gateway Technologies and the Evolutionary Dynamics of Network Industries: Lessons from Electricity Supply History," in *Evolving Technology and Market Structure: Studies in Schumpeterian Economics*, ed. Arnold Heertje and Mark Perlman (Ann Arbor: University of Michigan Press, 1990), 121-56.
10. Eric Schatzberg, "An Old Role for the Military: Government Support for Metal Construction," chap. 4 in *Wings of Wood, Wings of Metal: Culture and Technical Choice in American Airplane Materials, 1914-1945* (Princeton, N.J.: Princeton University Press, 1999), 64-95.
11. 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.
12. Joyce Shaw Peterson, "Auto Work," chap. 3 in *American Automobile Workers, 1900-1933* (Albany: State University of New York Press, 1987), 30-45.
13. Henry Ford, "The Terror of the Machine," chap. 7 in *My Life and Work* (Garden City, NY: Doubleday, Page, 1922), 103-111.

14. David F. Noble, "Social Choice in Machine Design: The Case of Automatically Controlled Machine Tools," in *The Social Shaping of Technology*, ed. Donald MacKenzie and Judy Wajcman (Buckingham: Open University Press, 1999), 161-76.
15. 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.
16. Ralph Nader, *Unsafe at Any Speed: The Designed-In Dangers of the American Automobile* (New York: Grossman, 1972 [1965]), 3-41, 170-209 (chaps. 1, 5).
17. John M. Logsdon, "The Space Shuttle Program: A Policy Failure?" *Science* n.s. 232 (30 May 1986): 1099-1105.
18. Alex Roland, "The Shuttle: Triumph or Turkey?" *Discover*, Nov. 1985, 29-49.
19. Russel P. Boisjoly, Ellen F. Curtis, and Eugene Mellican, "Roger Boisjoly and the Challenger Disaster," *Journal of Business Ethics* 8 (1989): 217-30
20. 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.
21. Janet Abbate, "White Heat and Cold War: The Origins and Meanings of Packet Switching," chap. 1 in *Inventing the Internet* (Cambridge: MIT Press, 1999), 7-41.
22. Paul A. Strassmann, "Will Big Spending on Computers Guarantee Profitability?" *Datamation* 43 (Feb. 1997): 75-85.
23. Esther Dyson, George Gilder, George Keyworth and Alvin Toffler, "Cyberspace and the American Dream: A Magna Carta for the Knowledge Age," Release 1.2, August 22, 1994, formerly (but no longer) available at <http://www.townhall.com:80/pff/position.html>, modified July 11, 1996.
24. Langdon Winner, "Technology Today: Utopia or Dystopia," *Social Research* 64 (1997): 989-1017.