

History of Science 222, Fall 2002
Technology and Social Change in History

9:55-10:45 MWF, 2305 Engineering Hall

Professor:	Eric Schatzberg	Office Hrs:	2-3 Wed. or by appt.
Office:	7129 Social Science	Telephone:	262-3973
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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 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 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 social effects of technology in relation to gender, work, corporate responsibility, and international politics. The third part focuses on ethical issues, using the *Challenger* disaster and enthusiasm for computers as case studies.

Requirements:

Discussion. Fridays will be devoted to discussion. Attendance will count toward the discussion grade. Please come prepared to talk; try to make at least one halfway intelligent comment in each discussion.

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

Take-home essays. There will be two short take-home essay exams during the semester (due 10/14 and 11/25) and a take-home final (due 12/18).

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 one paragraph response on 6/6), 25%; discussion, 15%. 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 Underground Textbook Exchange, 664 State Street, 251-4444, email: undrgrnd@ix.netcom.com:

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. The cost is \$18.00.

All readings will be on reserve at College Library.

Religious Holidays and ADA Notice:

You can take off any religious holidays you want, as long as you make up the work. Instructors are not supposed to schedule tests on the more popular religious holidays. If I can't avoid it, I'll give observant students an alternative but equivalent assignment. Contrary to popular belief, the Tuesday and Wednesday before Thanksgiving are not holidays.

If you have a disability that might adversely affect your performance in this course, let me know and I'll do my best to accommodate you. For more information, contact the McBurney Disability Resource Center, 263-2741.

Handling Stress:

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/ex/counseling/>.

Course Outline

Part 1: Understanding Technical Change

Week 1 (9/4, 9/6) Introduction - The Fallacy of Technological Determinism

Outline of course; definitions of technology; technological determinism. No quiz Friday.

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

"Exxon Mobil Meets Amazon.Com," *New York Times*, Dec. 5, 1998, A25.

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

Week 2 (9/9, 9/11, 9/13) Invention as a Social process

Invention and creativity; the telegraph as a case study.

Reading: Pursell, *White Heat*, 37-63 (chap 2);

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

Week 3 (9/16, 9/18, 9/20) Development and Innovation

From concept to market.

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 (9/23, 9/25, 9/27) Science and Technological Change

The invention of the steam engine as a case study.

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 (9/30, 10/2, 10/4) 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 A. David, "Understanding the Economics of QWERTY: The Necessity of History," 30-49.

Week 6 (10/7, 10/9, 10/11) The Military as an Agent of Technological Change

Military roots of key modern technologies; computers as a case study. No quiz Friday.

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

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.

Assignment: First take-home essay exam (due Monday, 10/14).

Part 2: Technology and Society

Week 7 (10/14, 10/16, 10/18) Technology, Production and Work, 1

Managers, workers, and control of the labor process.

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.

Week 8 (10/21, 10/23, 10/25) Technology, Production and Work, 2

Labor and technological choice in manufacturing.

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 (10/28, 10/30, 11/1) Technology and Gender 1: Who Does the Dishes?

The industrialization of housework.

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

Week 10 (11/4, 11/6, 11/8) Technology and Gender 2: Technologies of Consumption

Failed alternatives and the dominance of the postwar suburbs.

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

Week 11 (11/11, 11/13, 11/15) Automobiles, Engineers and Corporate Responsibility

Ralph Nader's critique of auto safety. Reading: Ralph Nader, *Unsafe at Any Speed*, 3-41, 170-209 (chaps. 1, 5).

Week 12 (11/18, 11/20, 11/22) 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;

Zbigniew Brzezinski, "The True U.S. Interests in the Gulf," *Washington Post*, Aug. 16, 1990, A23;

Barbara Conry, "Time Bomb: The Escalation of U.S. Security Commitments in the Persian Gulf Region," *Cato Policy Analysis* No. 258 (Aug. 29, 1996).

Assignment: Second take-home essay exam (due Monday, 11/25).

Part 3: Engineering Disasters, Computers, and the Future

Week 13 (11/25, 11/27) The Shuttle Challenger Disaster, 1

From Sputnik to the Shuttle program.

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

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

Thanksgiving Break (11/29)

Week 14 (12/2, 12/4, 12/6) 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 (12/9, 12/11, 12/13) Hope and Hype for the Digital Age

Contrasting views on digital technology.

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.

Wednesday, Dec. 18 - Final Essay Due

Third take-home essay due, 7129 Social Science at 2:30 pm.

Course Packet Contents

1. "Exxon Mobil Meets Amazon.Com," *New York Times*, Dec. 5, 1998, A25.
2. Brooke Hindle, *Emulation and Invention* (New York: Norton, 1981), 85-142, 149-53.
3. James L. Adams, *Flying Buttresses, Entropy, And O-Rings: The World of an Engineer* (Cambridge: Harvard University Press, 1993), 151-68.
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. 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.
10. 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.
11. 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.
12. 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.
13. Joyce Shaw Peterson, "Auto Work," chap. 3 in *American Automobile Workers, 1900-1933* (Albany: State University of New York Press, 1987), 30-45.
14. Henry Ford, "The Terror of the Machine," chap. 7 in *My Life and Work* (Garden City, NY: Doubleday, Page, 1922), 103-111.
15. 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.
16. 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.
17. 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).
18. 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.

19. Michael T. Klare, "The Geopolitics of War," *The Nation* 273 (Nov. 5, 2001), 11-15.
20. Zbigniew Brzezinski, "The True U.S. Interests in the Gulf," *Washington Post*, Aug. 16, 1990, A23.
21. 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.coato.org/pubs.pas/pa-258.html>.
22. John M. Logsdon, "The Space Shuttle Program: A Policy Failure?" *Science* n.s. 232 (30 May 1986): 1099-1105.
23. Alex Roland, "The Shuttle: Triumph or Turkey?" *Discover*, Nov. 1985, 29-49.
24. Russel P. Boisjoly, Ellen F. Curtis, and Eugene Mellican, "Roger Boisjoly and the Challenger Disaster," *Journal of Business Ethics* 8 (1989): 217-30.
25. Paul A. Strassmann, "Will Big Spending on Computers Guarantee Profitability?" *Datamation* 43 (Feb. 1997): 75-85.
26. 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, modified July 11, 1996.
27. Langdon Winner, "Technology Today: Utopia or Dystopia," *Social Research* 64 (1997): 989-1017.