

History of Science 337, Fall 2002
History of Technology: A Thousand-Year Survey
11:00-12:15 Tu Th, 6116 Social Science

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

"Technology is a relentless force that creates and destroys with little pity," proclaimed *Business Week* magazine in a 1998 editorial. Such claims pervade America's mass media, with professional pundits insisting that genetic engineering and the Internet will transform our world beyond recognition. Large corporations saturate the airwave with images of technological progress, claiming lineage to Edison or Einstein as marks of creativity.

This dominant view of technology is, I argue, highly distorted. Technology is central to human history, but it is a human product, not an autonomous force. Technology makes nothing happen by itself, but only as the result of human action.

This course seeks to understand the place of technology in the history of the West over roughly 1000 years ending in 1950, from the medieval cathedral to the atomic bomb. The course makes no attempt at comprehensive coverage, but rather presents technology as an integral part of human history. Major topics include the technological basis for Western expansion, the causes and consequences of the Industrial Revolution, and the rise of the United States as a technological power. Along the way we will learn a bit about cannons and gunpowder, spinning wheels and steam engines, electric lights and atomic bombs.

Two main themes run through the chronological narrative of the course. First is the role of organized violence in the rise of Western technology, mainly in the form of military power and coerced labor (i.e., slavery). The second theme concerns the tension between symbolic and utilitarian motives in the development of technology, that is, the tension between technologies that express human values and aspirations, and technologies devoted primarily to practical ends.

Requirements:

Reading responses. There will be four one-page readings responses during the semester, usually in conjunction with discussion. I will send out instructions by email. The responses are due on 9/5, 10/17, 11/14, 12/5.

Take-home essays. In lieu of in-class exams, there will be three take-home essay exams during the semester, including a take-home final. The essays are due 10/8, 11/5, and 12/19.

Discussion. Roughly every second Thursday is devoted to a formal discussion. Your discussion grade will be based on attendance and participation. At a minimum I expect at least one halfway intelligent comment from each student during these formal discussions.

Quizzes. At my discretion, I will give short, simple quizzes to insure that everyone is keeping up with the readings. These will be announced in advance, usually by email.

A note about writing. Writing is not just for English courses. I grade the essays on quality of prose as well as content. Help with writing is available from the Writing Center, <http://www.wisc.edu/writing/>.

Email Class List:

I have set up an email list for this course at "histsci-337@lists.students.wisc.edu." Anything mailed to the list will be distributed to everyone registered for the class. I will use the class list to distribute questions for the reading responses and essays. Students should feel free to

contribute to the list, for example, by commenting on the readings or raising questions regarding lectures.

Grades

Take-home essays, 55% (15% for first, 18% for the second, and 22% for final); reading responses, 20%; discussion and quizzes, 25%.

Course Books and Packet:

The following books are available from the Rainbow Bookstore Cooperative, 426 West Gilman Street (off State St.), 257-6050, open 10-6 MWF, 10-8 TuTh, 12-5 SaSu.

Carlo M. Cipolla, *Guns, Sails, and Empires: Technological Innovation and the Early Phases of European Expansion, 1400-1700* (Manhattan, Kan.: Sunflower University Press, c1965);

Patrick M. Malone, *The Skulking Way of War: Technology and Tactics Among the New England Indians* (Baltimore: Johns Hopkins University Press, 1991);

Wolfgang Schivelbusch, *Railway Journey: The Industrialization of Time and Space in the 19th Century* (Berkeley: University of California Press, 1986);

Loren R. Graham, *Ghost of the Executed Engineer: Technology and the Fall of the Soviet Union* (Cambridge: Harvard University Press, 1993).

A course packet for the other required readings is available for purchase from the History of Science department office, 7143 Social Science (262-1406); office hours 8:00 am to 3:00 pm. The price is \$19.00.

All readings are 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.

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/ex/counseling/>.

Course Outline

Week 1 (9/3, 9/5): Introduction – What is Technology, and Why Care About its History?

Overview of the course; defining technology. Discussion: the politics of technology.

Reading: Langdon Winner, "Do Artifacts Have Politics?" 19-39.

Assignment: one-page reading response on Winner due Thursday; come prepared for discussion.

Week 2 (9/10, 9/12): Symbolic Technologies of the Middle Ages

Symbolic versus utilitarian technologies--gothic cathedrals and mechanical clocks.

Reading: Arnold Pacey, "The Cathedral Builders," 1-28;
David Landes, *Revolution in Time*, 53-82.

Video: "The Cathedral Builders."

Week 3 (9/17, 9/19): Western Expansion, 1

Printing and gunpowder weapons; the technological basis for Western imperialism.

Reading: Carlo M. Cipolla, *Guns, Sails, and Empires*, 15-89.

Week 4 (9/24, 9/26): Western Expansion, 2

Europe becomes a global power.

Reading: Cipolla, 90-148;
Ronald Findlay, "The Roots of Divergence: Western Economic History in Comparative Perspective," 158-61.

Assignment: Come prepared for discussion Thursday.

Week 5 (10/1, 10/3): Western Expansion, 3

Encounters with the "new" world; the technological basis of the Atlantic economy.

Reading: Malone, *The Skulking Way of War*, 8-128.

Assignment: First essay due 10/8 (next Tuesday); discussion on Thursday, 10/3.

Week 6 (10/8, 10/10): Industrial Revolution–Economics and Technology

Nature of industrialization; key technological changes in textiles, iron and steam power.

Reading: E. J. Hobsbawm, *Industry and Empire*, 40-60 (note that we read chapter 3 this week and chapter 2 next);
Joel Mokyr, "The Years of Miracles," 81-112.

Week 7 (10/15, 10/17): Industrial Revolution—Causes

Science, Atlantic trade, and slavery.

Reading: E. J. Hobsbawm, *Industry and Empire*, 20-39;

Richard Olson, "Science, Technology and the Industrial Revolution," 316-44;

Barbara Solow, "Capitalism and Slavery in Exceedingly Long Run," 711-37.

Assignment: One-page reading response due 10/17.

Week 8 (10/22, 10/24): Industrial Revolution—Social Impact

Workers, the factory system, and resistance to skill-destroying machinery.

Reading: J. L. Hammond and Barbara Hammond, "The Shadow of the Slave Trade," 190-209;

Kirkpatrick Sale, *Rebels Against the Future*, 1-59, 126-151.

Video: "The Luddites."

Week 9 (10/29, 10/31): Industrialization and Western Culture

Railroads and their impact on Western consciousness.

Reading: Schivelbusch, *Railway Journey*, 1-123.

Assignment: Second short essay due, 11/5 (Tuesday of next week). Discussion Thursday.

Week 10 (11/5, 11/7): American Inventiveness and the Second Industrial Revolution

Technology in the late-nineteenth century: the age of heroic inventors and the rise of the industrial corporation.

Reading: Ruth Schwartz Cowan, *A Social History of American Technology*, 119-172 (chaps. 6, 7);

Thomas P. Hughes, "The Era of Independent Inventors," 151-168;

Week 11 (11/12, 11/14): Source of Innovation: Military and Big Business

The rise of the industrial research laboratory; military origins of mass production.

Reading: David Hounshell, *From the American System to Mass Production*, 25-50;

Thomas P. Hughes, "No Philanthropic Asylum for Indigent Scientists," 138-183;

Leonard S. Reich, "Industrial Research and the Pursuit of Corporate Security: the Early Years of Bell Labs," 504-529.

Assignment: reading response due 11/14.

Week 12 (11/19): Mass Production, the Faustian Bargain

Controlling workers; the assembly line; big technological systems.

Reading: Stephen Meyer, *The Five Dollar Day*, 9-94.

Thanksgiving Recess (11/21)

Week 13 (11/26, 11/28): Technology and Aesthetic Modernism

Technology as inspiration for art and architecture between the World Wars.

Reading: Hughes, "The Second Discovery of America," 295-297, 309-352;
Le Corbusier, *Towards a New Architecture*, 9-31.

Week 14 (12/3, 12/5): Technology, Ideology and the State

Technology under Stalinism.

Reading: Loren Graham, *Ghost of the Executed Engineer*, 1-106.

Assignment: reading response due Thursday 12/5; be prepared for discussion.

Week 15 (12/10, 12/12): The Manhattan Project and the Postwar Order

Origins of the military-university-industry-science-technology complex.

Reading: Hughes, "Manhattan Project," 381-442.

Final Essay Due, Monday, 12/19, 2:25 pm.

Turn in essay at my office, 7129 Social Science

Packet Contents

1. Langdon Winner, "Do Artifacts Have Politics?" in *The Whale and the Reactor* (Chicago: University of Chicago Press, 1986), 19-39.
2. Arnold Pacey, "The Cathedral Builders," in *The Maze of Ingenuity: Ideas and Idealism in the Development of Technology*, 2nd ed. (Cambridge: MIT Press, 1992), 1-28.
3. David Landes, *Revolution in Time: Clocks and the Making of the Modern World* (Cambridge: Harvard University Press, 1983), 53-82 (chaps. 3-4).
4. Ronald Findlay, "The Roots of Divergence: Western Economic History in Comparative Perspective," *American Economic Review* 82 no. 2 (1992): 158-61.
5. E. J. Hobsbawm, "The Origin of the Industrial Revolution," and "The Industrial Revolution, 1780-1840," in *Industry and Empire* (London: Weidenfeld & Nicolson, 1968), 23-78.
6. Joel Mokyr, "The Years of Miracles," in *The Lever of Riches: Technological Creativity and Economic Progress* (Oxford: Oxford University Press, 1990), 81-112.

7. Richard Olson, "Science, Technology and the Industrial Revolution," in *Science Deified & Science Defied*, vol. 2 (Berkeley: University of California Press, 1990), 316-44.
8. Barbara Solow, "Capitalism and Slavery in Exceedingly Long Run," *Journal of Interdisciplinary History* 17 (Spring 1987): 711-37.
9. J. L. Hammond and Barbara Hammond, "The Shadow of the Slave Trade," in *The Rise of Modern Industry*, 9th ed. (London: Methuen, 1966), 190-209.
10. Kirkpatrick Sale, *Rebels Against the Future: The Luddites and their War on the Industrial Revolution, Lessons for the Computer Age* (Reading, Mass., Addison-Wesley, 1995), 1-59, 126-151.
11. Ruth Schwartz Cowan, *A Social History of American Technology* (New York: Oxford University Press, 1997), 119-172 (chaps. 6, 7).
12. Thomas P. Hughes, "The Era of Independent Inventors," in *Science in Reflection*, ed. E. Ullmann-Margalit (Dordrecht: Kluwer, 1988), 151-168.
13. David Hounshell, *From the American System to Mass Production, 1800-1932* (Baltimore: Johns Hopkins University Press, 1984), 25-50.
14. Thomas P. Hughes, "No Philanthropic Asylum for Indigent Scientists," chap. 4 in *American Genesis: A Century of Invention and Technological Enthusiasm* (New York: Viking Penguin, 1989), 138-183.
15. Leonard S. Reich, "Industrial Research and the Pursuit of Corporate Security: the Early Years of Bell Labs," *Business History Review* 54 (1980): 504-529.
16. Stephen Meyer, *The Five Dollar Day: Labor Management and Social Control in the Ford Motor Company, 1908-1921* (Albany: State University of New York Press, 1981), 9-94 (chaps. 2-4).
17. Thomas P. Hughes, "The Second Discovery of America," in *American Genesis: A Century of Invention and Technological Enthusiasm* (New York: Viking Penguin, 1989), 295-297, 309-352.
18. Le Corbusier, *Towards a New Architecture* (New York, Brewer & Warren 1927), 9-31.
19. Thomas P. Hughes, "Manhattan Project," in *American Genesis: A Century of Invention and Technological Enthusiasm* (New York: Viking Penguin, 1989), 381-442.