

# TECHNOLOGY AND SCIENCE IN AMERICAN CULTURE

## History of Science 240

Fall 2003

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Office hours: call or drop in

Today it's a truism that we live in an age of science and technology. How has that come to pass, and what has it meant for our lives? To answer those questions, this course reviews the social history of science and technology in the colonies and in the United States. It focuses on constructing an understanding of how American society has influenced and in turn been influenced by the development of science and technology. The majority of our time will be spent on technology, rather than science.

### Classes

Classes meet Monday and Thursday afternoons, 1:10 - 2:15. With a few exceptions, they consist of discussion of assigned readings. Class participation is essential for arriving at clarification and qualification of ideas in the texts and in the discussion.

For the few lengthy reading assignments use skimming skills; it is not necessary to know every detail.

### Workload

Six times during the semester, students are to submit a short paper [2-3 pp], dealing with a topic in the reading, or one suggested by it. The purpose of these papers is to stimulate and focus discussion, and to practice writing. All 6 papers are to be written and handed in by Monday, November 24, the 23<sup>rd</sup> class session. There will be a midterm hour exam, a second hour exam after Thanksgiving, and a final short quiz.

Grades will be based on class participation [attendance, quality and frequency of interaction], papers, and exams, in proportions respectively of 30%, 30%, and 40%.

The following are the textbooks for the course:

R. S. Cowan	<u>A Social History of American Technology</u>
T.P. Hughes	<u>American Genesis: A History of the American Genius for Invention</u>
C. Pursell	<u>The Machine in America: A Social History of Technology</u>

In addition to the textbooks, there are a series of required and some recommended readings [articles, excerpts and chapters from books] available in a packet obtainable at cost, \$ 10.00 (443 pp) from Ms. Kate Fletcher, Administrative Assistant, 189 Bronfman:

Smith/Clancey, "What is Technology?"

Winner, "Brandy, Cigars, and Human Values"

R. S. Woodbury, "The Legend of Eli Whitney and Interchangeable Parts"

Cross and Szostak, "Iron, Steam, Rails"

Hindle and Lubar, "The *John Bull* and the Rise of American Railroading"

Cross and Szostak, "Machines on the Farm... 1800 - 1920"

B. Hindle and S. Lubar, "Farming and Raw Materials Processing: Causes and Effects of Mechanization"

Cross and Szostak, "Americans confront a Mechanical World"

D.E. Nye, "The American Sublime"

J. Kasson, "The Emergence of Republican Technology" [Ch. 1 of Kasson]

J. Kasson, "Technology and Utopia" [Ch. 5 of Kasson]

G. Basalla, "Keaton and Chaplin: The Silent Film's Response to Technology"

D. A. Hounshell, "The Ethos of Mass Production & Its Critics"

L. Marx, "Alienation and Technology"

L. White, Jr., "Dynamo and Virgin Reconsidered"

Fallows, "The American Army and the M-16 Rifle"

Smith/Clancey, "Countdown to Cyberspace: 1974 - 1990."

Abbate, "Cold War and White Heat: the Origins and Meanings of Packet Switching"

Smith/Clancey, "The Pest War: The Shifting Use and Meaning of Insecticides, 1940 - 1990"

Marcus "Unanticipated Aftertaste: Cancer, The Role of Science, and the Question of DES Beef..."

Marcus/Segal "Public and Private: Technology as a Social Question: The Later 1960s to the 1990s"

Marcus/Segal "Private and Public: Technology and Individual Autonomy: The Later 1960s to the 1990s"

## Classes and Reading Assignments

1. 9/4 R Introduction. Social History of Science and Technology. The American Context. Science, Technology, and "Values"  
  
Rec.: Smith/Clancey, Ch. 1 (1-25) "What is Technology? Packet Winner, Ch. 9 (155-163) "Brandy, Cigars, and Human  
  
**From the Colonial Period to the Early Republic.**
2. 9/8 M Colonial Technology  
  
Pursell, Ch. 1 (9-33), "The Tools Brought Over"  
Cowan, Ch. 1 (5-27) "The Land, the Natives, and the Settlers"; Ch. 2 (28-43) "Husbandry and Huswifery in the Colonies"; Ch. 3 (45-65) "Colonial Artisans"
3. 9/11 R Science in the Colonies and Early Republic  
  
**The Nineteenth Century; Technology to the Civil War**
4. 9/15 M The American System of Manufacturing - The Industrial Revolution Comes to America  
  
Pursell, Ch. 2 (35-63) "Importing the Industrial Revolution"  
Cowan, Ch. 4 (69-91) "The Early Decades of Industrialization"  
Pursell, from Ch. 4 (87-97): "The Expansion of American Manufactures" American System, mass production  
  
Rec:  
Smith/Clancey, Ch. 5 (144-189) "Inside Factory Systems, 1820 - 1885"  
Woodbury, "The Legend of Eli Whitney and Interchangeable Parts"

## 5. 9/18 R Transportation

Pursell, Ch. 3 (65-83) "Improving Transportation"  
Cowan Ch. 5 (93 - 118) "Transportation Revolutions"  
Cross/Szostak Ch. 6 (82 - 103) "Iron, Steam, Rails" Packet

Rec:

Smith/Clancey, Ch. 6 (191-232) "'Second Nature': Steam, Space, and a New World Order, 1840-1900" Packet  
Hindle and Lubar, (125 -151) "The *John Bull* and the Rise of American Railroading" Packet

6. 9/22 M Agriculture, from colonial times to the later 19<sup>th</sup> century

Pursell Ch. 5 (109-128) "The Mechanization of Farming"  
Cowan (173-178) "Farmers and Unexpected Outcomes"  
Cross/Szostak Ch. 8 (120 - 130) "Machines on the Farm... 1800 - 1920" Packet

Rec:

Hindle and Lubar, (94-108) "Farming and Raw Materials Processing: Causes and Effects of Mechanization" Packet

## 7. 9/25 R Engineers and Engineering; Changing Urban Environments

Pursell, from Ch. 4 (97 - 107) "The Expansion of American Manufactures": patents and engineers  
Pursell, Ch. 6 (131 -153) "Creating an Urban Environment"  
Cowan, Ch. 6 (119 -147) "Inventors, Entrepreneurs, and Engineers"

## 8. 9/29 M Expanding Frontiers: Westward Ho! A Rising Empire.

Pursell, Ch. 7 (155 -178) "Westward the Course of Industry"  
Pursell, Ch. 8 (179 - 199) "Export, Exploitation, and Empire"

## 9. 10/2 R From Amateur to Professional: Science and Scientists in the Nineteenth Century (A lecture, interrupted by questions)

Rec:

Bruce, R. V. The Launching of Modern American Science, 1846-1876

10. 10/6 M Late 19<sup>th</sup> Century Attitudes to Technology

Cowan Ch. 9 (201-218) "American Ideas about Technology"  
Kasson, "Technology and Utopia" (183-234) Packet  
Cross and Szostak, Ch. 9 "Americans confront a Mechanical

## World" (135-147) Packet

Rec: Nye, "The American Sublime" (17 - 43) Packet  
Kasson, Ch. 1, "The Emergence of Republican Technology"  
 (3 - 51) Packet

11. 10/9 R "Systems"

Pursell, Ch. 9 (203-228) "The Coming of Science and Systems"  
Cowan Ch. 7 (150-171) "Industrial Society and Technological Systems"

-----**READING PERIOD**-----

12. 10/16 R

**Midterm Examination**

**From 1865 to 1918: Between the Wars**

13. 10/20 M The Age of Heroic Invention.

Hughes, Ch. 1-2 (13-95): "A Gigantic Tidal Wave of Human Ingenuity"; "Choosing and Solving Problems"

14. 10/23 R Military Invention, and Industrial Research Laboratories

Hughes, Ch. 3-4 (96-183) "Brain Mill for the Military";  
 "No Philanthropic Asylum for Indigent Scientists"

15. 10/27 M Taylorism and Fordism (Scientific Management, Assembly Lines, and the Gospel of Efficiency)

Hughes, Ch. 5-6 (184-248; 249-294) "The System Must Be First"; "Taylorismus + Fordismus = Amerikanismus"

Rec: Smith/Clancey, Ch. 8 (267-311) "Inventing Efficiency: Scientific Management, ca. 1900 - 1939"

Smith/Clancey, Ch. 9 (312-354) "Ford, Automobility, and Mass Production, 1908 - 1941"

16. 10/30 R American Life in Transformation: Industrialization, Prosperity, Consumption, Depression (1870s - 1930s)

Cowan, (178-200) "Daily Life and Mundane Work"  
 (Workers, Housewives, Servants)

Pursell, Ch. 10 (229-250) "The Decade of Prosperity and Consumption"

Pursell, Ch. 11 (251-269) "Depression: Study and Subsidy"

**Post WWI and the Depression**

## 17. 11/3 M Critical Reflections on Technology.

Hughes, Ch. 7 (295-352) "The Second Discovery of America"

Basalla "Keaton and Chaplin: The Silent Film's Response to Technology" (192-201) Packet

Hounshell Ch. 8 "The Ethos of Mass Production & Its Critics" (303 - 330) Packet

Marx, "Alienation and Technology" (121-130) Packet

White, "Dynamo and Virgin Reconsidered" (57-73) Packet  
Recommended Films: "Modern Times"; "Metropolis"

## 18. 11/6 R The TVA, Electricity, and the Atomic Bomb

Hughes, Ch. 8 (353-442) "Tennessee Valley and Manhattan Engineer District"

## 19. 11/10 M From little science to BIG SCIENCE: Science, Scientists, and Institutions in the Twentieth Century

From "pure science" to entrepreneurial science, from collaboration to teamwork, from freely sharing to patenting, science has become "a national resource."  
(No assigned reading; questions instead)

20. 11/13 R The Military Industrial Complex, WWII, and its Legacy in Science and Technology.

Cowan, Ch. 11 (250-270) "Taxpayers, Generals, and Aviation"

Pursell, Ch. 12 (271-297) "Wars and the American Century"

Fallows, "The American Army and the M-16 Rifle" (382 - 394) Packet

Rec: Smith/Clancey, Ch. 12 (427-469) "The Military - Industrial - University Complex, 1945-1990"

### **From WWII to Y2K: Modern to Postmodern Technology**

21. 11/17 M Communications, Computers, and Information: A Revolution?

Cowan, Ch. 12 (273-298) "Communications Technologies and Social Control"

Smith/Clancey, Ch. 13 (471-519) "Countdown to Cyberspace: 1974 - 1990. Packet

Abbate "Cold War and White Heat: the Origins and Meanings of Packet Switching" (351 - 371) Packet

22. 11/20 R Biotechnology: Postwar Expansion. Farm Pest Control.

Cowan, Ch. 13 (301-326) "Biotechnology"

Smith/Clancey, Ch. 11 (383-426) "The Pest War: The Shifting Use and Meaning of Insecticides, 1940 - 1990" Packet

Marcus (191 - 205) "Unanticipated Aftertaste: Cancer, The Role of Science, and the Question of DES Beef..." Packet

23. 11/24 M **2<sup>nd</sup> Hour Examination**

Note: The **deadline** for **all 6 papers** is **5:00 pm today, Monday 11/24**

-----**THANKSGIVING RECESS**-----

24. 12/1 M Making Sense of the Past 40 Years: Limits, Controls, Prognoses.

Marcus/Segal Ch. 10 (299 - 333) "Public and Private: Technology as a Social Question: The Later 1960s to the 1990s" Packet

Marcus/Segal Ch. 11 (334 - 381) "Private and Public: Technology and Individual Autonomy: The Later 1960s to the 1990s" Packet

25. 12/4 R Countercultural Reactions and Alternative Technology Suggestions for the Future **Quiz** (very brief). SCES

Pursell Ch. 13 (299-319) "Challenge, Defense, and Revolution in a Postmodern World"

Hughes, Ch. 9 (443-472) "Counterculture and Momentum"

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**Selected Readings in the History of American Science and Technology**

- Boorstin, D. The Americans: the Democratic Experience
- Bruce, R. V. The Launching of Modern American Science, 1846-1876
- Cassedy, J. H. Medicine in America : a Short History
- Cowan, R. S. More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave, 1983
- Cravens, H., Technical Knowledge in American Culture: Science, Technology, and Medicine since the Early 1800s 1996
- Marcus, A., and Katzman, P.M., eds.
- Cross, G. and Szostak, R. Technology and American Society: A History 1995
- Daniels, G. American Science in the Age of Jackson
- Daniels, G. Science in American Society 1971
- Dupree, A. H. Science in the Federal Government
- Duffy, J. From Humors to Medical Science: A History of American Medicine, 2nd edition, [Formerly, The Healers] 1993
- Elliot, Clark A. History of Science in the United States: A Chronology and Research Guide, 1996
- Elliott, Clark A., comp. Biographical Index to American Science: The Seventeenth Century to 1920. 1990
- Fogel, R. Railroads and American Economic Growth 1964
- Hindle, B. The Pursuit of Science in Pre-Revolutionary America
- Hindle, B. and Lubar, S. Engines of Change: The American Industrial Revolution, 1790-1860. 1986
- Hounshell, D. From the American System to Mass Production, 1800-1932
- Hunter, L. Steamboats on Western Rivers 1949
- Kasson, J. F. Civilizing the Machine 1976



- King, L. S. Transformations in American Medicine : from Benjamin  
Rush to William Osler
- Layton, E., ed. Technology and Social Change in America 1973
- Link, E. P. The Social Ideas of American Physicians (1776-1976) :  
Studies of the Humanitarian Tradition in Medicine
- Marcus, A. and Segal, H.P. Technology in America: A Brief History 1989
- Marx, L. The Machine in the Garden 1964
- Nye, D. The American Technological Sublime 1994
- Pursell, C., ed., Technology in America: A History of Individuals and Ideas 81
- Pursell, C. The Machine in America: A Social History of Technology 95
- Rae, J. B. The American Automobile
- Reingold, N., ed. Science in Nineteenth Century America, a Documentary  
History
- Rothenberg, M. The History of Science in the United States: A Critical  
and Selective Bibliography 1993
- Shryock, R. H. Medicine and Society in America, 1660-1860.
- Smith, M. R. and Major Problems in the History of American Technology 1998  
Clancey, G. eds
- Stearns, R. P. Science in the British Colonies of North America
- Struik, D. J. Yankee Science in the Making
- van Tassel, D. D., and Hall, M. G., eds. Science and Society in the United  
States 1966
- Winner, L. The Whale and the Reactor