

Rackham Interdisciplinary Seminar  
Winter 2002  
Mondays 1–4 PM, 1644 SSWB

## **TECHNOLOGY AS POWER: IDEOLOGY, INFRASTRUCTURE, AND PRACTICE**

Instructors:

Paul N. Edwards, School of Information  
Gabrielle Hecht, Department of History  
Joel Howell, Depts. of Internal Medicine, Health Management and Policy &  
History

### **INTRODUCTION**

All over the world, technological artifacts, processes, knowledges, and ideologies have been used to mediate power relationships among groups of people. In the 17<sup>th</sup> and 18<sup>th</sup> centuries, guns, bows and arrows, and ships were vital in the European conquest of Africa and the Americas, as well as in resistance and response to that conquest. In the 19<sup>th</sup> century, infrastructural technologies — such as railroads, irrigation, or designed urban spaces — were important instruments of state formation in Europe and the U.S., and instruments of colonial rule in Asia, Africa, and Latin America. Within regions too, social groups have conducted relationships with each other through their access to and use of technologies. In the 20<sup>th</sup> century, separations between those with and without access to electronic communication have mirrored inequalities due to class and racial divides. Health care has come increasingly to be mediated through technological means.

Of course, the ways in which social negotiations are conducted through technological exchange vary tremendously. The dynamics at work for villagers and peasants negotiating land and water rights are obviously not exactly the same as those for medical doctors or mechanical engineers seeking to enhance their professional status. Nonetheless, in both these cases and many others, technology provides an important window into understanding the transformation and performance of power.

This course offers students an introduction to a range of theoretical and methodological tools with which to study the performance of power through technology, drawing upon scholarship in history, sociology, information science, anthropology, and cultural studies. We will examine how political, social, economic, and cultural factors shape technological development, as well

as how that development changes society, politics, and culture. By treating technologies as systems that include human, artifactual, cultural, and institutional components, we will explore ways in which the study of technology enables us to transcend analytic divides common in the social sciences and humanities – in particular, oppositions between macro and micro levels of analysis and between material and discursive analysis.

Readings for the course will draw primarily upon the interdisciplinary field known as Science and Technology Studies (STS). Contemporary STS research ranges from traditional history of science to more recent sociological, anthropological, and cultural studies analyses of technology and medicine. By learning and borrowing across disciplines, as well as across the larger divides between science, engineering, medicine, social sciences, and humanities, STS researchers have developed a broad array of vigorous new intellectual approaches. Readings and discussions will focus on theory and methods, for a variety of reasons. Theory is the most important STS resource; common theoretical approaches are what enable a wide variety of practitioners to communicate with each other. Methods are what typically distinguish disciplines from one another. While methodological differences certainly exist among STS practitioners, one of the strengths of the field comes from the ways in which practitioners originating in different disciplines have learned from each other's methods. By focusing on theory and methods, the course will provide both a solid foundation for students who wish to pursue STS-related research, and an analytic toolbox for those whose main research interests lie elsewhere.

## ***Requirements: Assignments and Expectations***

### ***Discussion***

This is a discussion seminar. Its success depends on the commitment and involvement of all participants. Therefore, you are expected to arrive in class thoroughly prepared and to participate actively in all discussions.

Twice during the term, you will help lead class discussion. This will involve:

- Selecting and reading one of the books from the “recommended reading” list for that week. **Note:** *a few articles are included in the “recommended” list. If you choose one of these, you should review one of the books as well.*
- Preparing a 500–600 word summary of that book
- Distributing the summary to the class by email **no later than 8 PM** the night before class meets
- Meeting with the other student(s) who are presenting on readings and collectively preparing a one– page handout (maximum 450 words) as an aid to class discussion. This handout should list what you consider to be

- the three or four most interesting analytical points for the week's reading, including both the main assignment and the recommended reading you did. The handout should also offer two questions designed to provoke interesting, wide-ranging general class discussion; the questions should focus on how concepts, theories, or historiographical frames from the readings might be applied to other topics or issues.
- At the beginning of that class session, presenters will spend no more than 15 minutes explaining how the recommended reading related to the common reading, and elaborating your discussion questions. All presenters should participate in the presentation.

### **Reading**

Required readings can be found in the coursepack (available from Excel on South University) and in the following books (available from Shaman Drum):

- Bowker, Geoffrey C., and Susan Leigh Star. 1999. *Sorting Things Out: Classification and its Consequences*. Cambridge, MA: MIT Press.
- Castells, Manuel. 1996. *The Rise of the Network Society*. Cambridge, MA: Blackwell Publishers.
- Haraway, Donna. 1997. *Modest\_Witness@Second\_Millennium. FemaleMan\_Meets\_OncoMouse™: Feminism and Technoscience*. New York: Routledge.
- Hunt, Nancy Rose. 1999. *A Colonial Lexicon of Birth Ritual, Medicalization, and Mobility in the Congo*. Durham, NC: Duke University Press.
- Latour, Bruno. 1996. *Aramis, or the Love of Technology*. Cambridge, MA: Harvard University Press.
- Marks, Harry M. 1997. *The Progress of Experiment: science and therapeutic reform in the Unites States, 1900–1990*. Cambridge [England]; New York: Cambridge University Press.
- Oldenzil, Ruth. 1999. *Making Technology Masculine: men, women, and modern machines in America, 1870–1945*. London: Amsterdam University Press.
- Wailoo, Keith. 2001. *Dying in the City of the Blues: sickle cell anemia and the politics of race and health*. Chapel Hill: University of North Carolina Press.
- Yates, JoAnne. 1989. *Control through Communication: The Rise of System in American Management*. Baltimore: Johns Hopkins University Press.

In addition, for most of the weeks we have listed additional, recommended reading. Twice during the semester, you will select items from that recommended reading (usually a book, sometimes a selection of articles) to read in addition to the required reading for the course. You will then present a

summary of that reading to the rest of the class. Whenever possible, these recommended readings have been placed on reserve in the Undergraduate Library. Even when it is not your turn to present, you are strongly encouraged to spend a couple of hours every week skimming and reading small chunks of the recommended items that most appeal to you.

### **Writing**

All writing assignments should be submitted BOTH on paper (in class) AND electronically, at the Coursetools website:

<https://coursetools.ummu.umich.edu/2002/winter/rackham/570/001.nsf>

- 1) **Weekly responses.** Every week — except for the ones in which you are leading discussions and doing the recommended reading — you must turn in a 500–600 word response to the required reading. This should be double-spaced. On no account should you exceed 600 words. Rather than merely summarize the reading, you should engage with it analytically. ***The electronic version of this response is due at 9 a.m. on the day of the seminar, submitted to the Coursetools site.***
  
- 2) **Final project.** Your final project will be a paper 3000–4000 words in length. The choice of topic is up to you, but all topics must address an issue where technology intersects interestingly and importantly with ideology, infrastructure, and practice. Examples might include technology and terrorism, AIDS in international perspective, or gendered technologies. Additionally, all papers must directly engage with some of the theory and methods covered by the course.

This assignment has three parts.

- (a) A 300–500 word *proposal*, clearly describing your topic and how it relates to course materials and concepts, is ***due in class on February 11 (bring 3 paper copies)***. You must turn this in when it is due, but you can change your topic later by turning in another proposal ***before March 4***.
  
- (b) A *full-length, high-quality draft* will be due on March 25th. It will be returned within a week, with comments and suggestions for revisions.
  
- (c) The *final version*, edited, revised, and proofread, is due at the final class session (date TBD).

### ***Seminar paper option***

In response to strong demand, we are offering course participants the option of writing a seminar paper. Because the course was not originally designed for this purpose, and because it carries a full work load on its own, you must register for an independent study with one of us in order to pursue this option. You can register for anything from 1–3 units, according to whatever constraints are imposed by your funding and registration situation. The expectations will be the same regardless of the number of units. You will still be expected to do the readings, the presentations, and the weekly responses for the regular course. The only difference will be in your final project: you will follow the deadlines given in 2 (above), but your final product for the purposes of this course will instead be a long proposal/early draft for your seminar paper.

The seminar papers themselves must meet the following criteria:

- They should be based on extensive, primary–source–based research
- They should be of publishable quality
- They should be 25–40 pages in length, fully footnoted
- The final drafts are due no later than August 31, 2002; since this represents a significant extension beyond the end of the Winter semester, we cannot accept any late papers.

Please note that we cannot offer the extensive classtime guidance normally provided during a formal research seminar. Nonetheless, at various points during the semester we will spend the last hour of class time discussing research methods. You will also meet with your independent study mentor 2–3 times during the semester to discuss your project.

# COURSE SCHEDULE

JANUARY 7

GENERAL INTRODUCTION

JANUARY 14

THEORY AND HISTORIOGRAPHY IN TECHNOLOGY STUDIES

From W. Bijker, T. Hughes and T. Pinch, eds., *The Social Construction of Technological Systems* (MIT, 1987):

- Trevor J. Pinch and Wiebe E. Bijker, "The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other," pp. 17–50;
- Thomas Hughes, "The Evolution of Large Technical Systems," 51–82
- Michel Callon, "Society in the Making: The Study of Technology as a Tool for Sociological Analysis," pp. 83–102.

From Bijker and Law, eds., *Shaping Technology/Building Society* (MIT, 1992).

- Madeleine Akrich, "The De-Description of Technical Objects," pp. 205–224

Gabrielle Hecht, "Political Designs: Nuclear Reactors and National Policy in Postwar France," *Technology and Culture* (October 1994): 657–685.

Paul N. Edwards, "Think Piece: Making History — New Directions in Computer Historiography," *IEEE Annals of the History of Computing* 23:1 (2001), 86–88. Available online at <http://www.si.umich.edu/~pne/PDF/makinghistory.pdf>.

Paul N. Edwards, "The Army and the Microworld: Computers and the Politics of Gender Identity," *Signs* 16, 1 (1990): 102–127.

Joel Howell, "Early Perceptions of the Electrocardiogram: From Arrhythmia to Infarction," *Bulletin of the History of Medicine* 58 (1984): 83–98.

## Recommended readings:

- Debate on social construction in *Technology and Culture* (**note:** this set of four articles counts as a "book" for discussion leaders):
  - Edward W Constant III, "Reliable Knowledge and Unreliable Stuff: On the Practical Role of Rational Beliefs," *T&C* 40 (2): 324–357
  - Philip Scranton, "Missing the Target? A Comment on Edward Constant's 'Reliable Knowledge and Unreliable Stuff'," *T&C* 41 (4): 752–764
  - John Law and Vicky Singleton, "Performing Technology's Stories: On Social Constructivism, Performance, and Performativity," *T&C* 41 (4): 765–775.

Edward W Constant III, "Performance is a Moving Target, Reliably," *T&C* 41 (4): 776–782.

- David Hess, *Science Studies: An Advanced Introduction*
- Harry Collins and Trevor Pinch, *The Golem at Large: what you should know about technology*

**JANUARY 21**

**MEDICINE AND HISTORIOGRAPHY**

*MLK DAY: WE WILL RESCHEDULE IF THAT REFLECTS THE WILL OF COURSE PARTICIPANTS, BUT WE HAVE CHOSEN THIS READING TO REFLECT THE SPIRIT OF MLK DAY.*

Keith Wailoo, *Dying in the City of the Blues: Sickle Cell Anemia and the Politics of Race and Health*

Recommended readings:

Joel Howell, *Writing Willowbrook, Reading Willowbrook: The Recounting of a Medical Experiment* (Chapter, in press)

Joel Howell, *Technology in the Hospital: Transforming Patient Care in the Early Twentieth Century*, chapter 4, "Clinical use of the X-ray machine: The newest technology at the oldest hospitals," chapter 5, "The X-ray image: meaning, gender, and power," and chapter 8, "Machines and medicine: Lessons from the early twentieth century."

David J. Rothman: *Beginnings Count, The Technological Imperative in Health Care* (Oxford 1997).

Margarete Sandelowski, *Devices and Desires: Gender, Technology, and American Nursing* (UNC 2000).

**TECHNOLOGY AS IDEOLOGY**

**JANUARY 28**

**TECHNOLOGY, THE VERY IDEA!**

Ruth Oldenziel, *Making Technology Masculine*

Recommended readings:

Gabrielle Hecht, *The Radiance of France*  
Michael Adas, *Machines as the Measure of Men*  
David Noble, *The Religion of Technology*  
Thomas Hughes, *American Genesis*

**FEBRUARY 4**

**CREATING MEDICAL KNOWLEDGE**

Harry Marks, *The Progress of Experiment: Science and Therapeutic Reform in the United States, 1990–1990*

Recommended readings:

Marc Berg, "Order(s) and Disorder(s): Of protocols and Medical Practices," 226–246, in Marc Berg and Annemarie Mol, eds., *Differences in Medicine: Unraveling Practices, Techniques, and Bodies* (Duke University Press, 1998).

Paul Rabinow, *Making PCR: A Story of Biotechnology*. Chicago 1996.

Keith Wailoo, *Drawing Blood: Technology and Disease Identify in Twentieth-Century America*. Hopkins 1997.

## **TECHNOLOGY AS INFRASTRUCTURE**

**FEBRUARY 11**

**INFORMATION AS TECHNOLOGY AND POWER**

Hanseth, Ole, and Eric Monteiro. 1998. *Understanding Information Infrastructure*. Unpublished manuscript. University of Oslo, Oslo, Norway. Available online at <http://www.ifi.uio.no/~oleha/Publications/bok.html>. Read Chapters 1 and 3–8.

Geoffrey C. Bowker and Susan Leigh Star. 1999. *Sorting Things Out: Classification and its Consequences*. Cambridge, MA: MIT Press. Read Chapters 1–4, 6–7, 9–10.

Recommended readings:

Paul N. Edwards, "Y2K: Millennial Reflections on Computers as Infrastructure." *History & Technology* 15 (1998), 7–29. Available online at <http://www.si.umich.edu/~pne/PDF/y2k.pdf>

Paul N. Edwards, "Infrastructure and Modernity: Force, Time, and Social Organization in the History of Sociotechnical Systems," in Philip Brey, Arie Rip, and Andrew Feenberg, eds., *Technology and Modernity: The Empirical Turn* (Cambridge, MA: MIT Press, forthcoming 2002). Available online at <http://www.si.umich.edu/~pne/PDF/twente.pdf>

Mayntz, Renate, and Thomas P. Hughes, eds. *The Development of Large Technical Systems*. Boulder, CO: Westview Press, 1988.

Summerton, Jane, ed. *Changing Large Technical Systems*. Boulder, CO: Westview Press, 1994.

**FEBRUARY 18**  
**PRACTICES)**

**COLONIAL AND POST-COLONIAL INFRASTRUCTURES (AND**

Bryan Pfaffenberger, "The Harsh Facts of Hydraulics: Technology and Society in Sri Lanka's Colonization Schemes," *Technology and Culture* (1990): 361–397.

Geneviève Bédoucha, "The Watch and the Waterclock," in *Technological Choices: Transformation in material cultures since the Neolithic*, ed. Pierre Lemonnier (London: Routledge, 1993), 77–107.

Christophe Bonneuil, "Science and State Building in Late Colonial and Postcolonial Africa: 1930–1970," in Roy McLeod, ed., *Nature and Empire: Science and the Colonial Enterprise*. *Osiris* 15 (2000): 258–281.

Suzanne Moon, "Takeoff or Self-Sufficiency? Ideologies of development in Indonesia, 1957–1961," *Technology and Culture* 39 (1998): 187–212.

Gyan Prakash, *Another Reason: Science and the Imagination of Modern India* (Princeton, 1998): 3–14, 159–237.

Gabrielle Hecht, "Decolonization in the Nuclear Age: Uranium Mining in Gabon and Madagascar," draft submitted to *Social Studies of Science* for a special issue on "Postcolonial Technoscience."

Recommended readings:

Daniel Headrick, *The Tools of Empire and The Tentacles of Progress*.

Gwendolyn Wright, *The Politics of Design in French Colonial Urbanism*

Peter Redfield, *Space in the Tropics*

D. Graham Burnett, *Masters of All They Surveyed: Exploration, Geography, and a British El Dorado*

William Storey, *Science and Power in Colonial Mauritius*

Itty Abraham, *The Making of the Indian Atomic Bomb*

**FEBRUARY 25**

**SPRING BREAK**

**MARCH 4**

**CONTROL THROUGH COMMUNICATION**

JoAnne Yates. 1989. *Control through Communication: The Rise of System in American Management*. Baltimore: Johns Hopkins University Press.

Recommended readings:

Chandler, Alfred Dupont, and James W. Cortada. *A Nation Transformed by Information*. New York: Oxford University Press, 2000.

Edwards, Paul N. *The Closed World: Computers and the Politics of Discourse in Cold War America*. Cambridge, MA: MIT Press, 1996.

Hughes, Thomas P. 1983. *Networks of Power: Electrification in Western Society, 1880–1930*. Baltimore, MD: Johns Hopkins University Press.

Hughes, Thomas Parke. 1998. *Rescuing Prometheus*. New York: Pantheon Books.

Misa, Thomas J. 1995. *A Nation of Steel: the making of modern America, 1865–1925*. Baltimore: Johns Hopkins University Press.

**MARCH 11**                      **INFRASTRUCTURE AND IDENTITY**

Manuel Castells. 1996. *The Rise of the Network Society*. Cambridge, MA: Blackwell Publishers.

Recommended readings:

Manuel Castells. 1997. *The Power of Identity*. Malden, MA: Blackwell.

Manuel Castells. 1998. *End of Millennium*. Malden, MA: Blackwell Publishers.

Jon Stratton. 1997. "Cyberspace and the Globalization of Culture." In *Internet Culture*, ed. David Porter, pp. 253–76. New York: Routledge.

Sherry Turkle. 1995. *Life on the Screen: Identity in the Age of the Internet*. New York: Simon & Schuster.

Arjun Appadurai, *Modernity at Large*

Peter Bacon Hales, *Atomic Spaces*

**TECHNOLOGY AS PRACTICE**

**MARCH 18**                      **ALL PRACTICE, ALL THE TIME**

Bruno Latour, *Aramis, or the Love of Technology* (Harvard, 1996).

Bruno Latour, *Pandora's Hope: Essays on the Reality of Science Studies*. (Harvard, 1999).: pp. 1–23, 174–215. (**NOTE: the readings from**

***Pandora's Hope* are meant to help you contextualize and understand the significance of *Aramis*)**

Recommended readings:

Bruno Latour, *Science in Action*

Bruno Latour, *We Have Never Been Modern*

Harry Collins & Martin Kusch, *The Shape of Actions: What Humans and Machines Can Do*

**MARCH 25                      FIRST DRAFTS DUE – NO READING**

**APRIL 1                         PERFORMING TECHNOLOGY**

Nancy Hunt. 1999. *A Colonial Lexicon of Birth Ritual, Medicalization, and Mobility in the Congo*. Durham, NC: Duke University Press.

Recommended readings:

Jeffrey P. Baker, *The Machine in the Nursery: Incubator Technology and the Origins of Newborn Nursing Care*

Joel Braslow, *Mental Ills and Boldly Cures: Psychiatric Treatment in the First Half of the Twentieth Century*

Monica J. Casper, "Working on and Around Human Fetuses: The Contested Domain of Fetal Surgery," 28–52, in Marc Berg and Annemarie Mol, eds., *Differences in Medicine: Unraveling Practices, Techniques, and Bodies* (Duke University Press, 1998).

**APRIL 8                         INTELLECTUAL PRACTICE IN A TECHNOLOGICAL WORLD**

Haraway, Donna Jeanne. 1997.

*Modest\_Witness@Second\_Millennium.FemaleMan\_Meets\_OncoMouse™: Feminism and Technoscience*. New York: Routledge.

Recommended readings:

Haraway, Donna Jeanne, and Thyrza Nichols Goodeve. 2000. *How like a leaf : an interview with Thyrza Nichols Goodeve*. New York: Routledge.

Allucquere Roseanne Stone, *The war of desire and technology at the close of the mechanical age*

**APRIL 15 — FINAL CLASS MEETING WILL BE RESCHEDULED FOR LATER IN THE WEEK.**

**NO READINGS – FINAL PAPERS DUE.**