

## History 549S: Histories of Science and Technology

Prof. Evan Hepler-Smith

Fall 2019

Mondays, 10:05am–12:35pm // [Location TBD]

[Email TBD] // Office Hours: TBD + by appointment, Classroom 319

This course introduces students to methods in the history of science and technology, with attention to global and interdisciplinary perspectives. In addition to various historical approaches, readings may also include work in ethnography, feminist theory, postcolonial studies, Science & Technology Studies (STS), environmental studies, and other related fields. Particular emphasis will be placed on understandings of materials and material agency, as well as situating a range of themes central to modern science and technology—such as quantification, innovation, infrastructure, and information—within broader historical contexts.

This semester, our aim is to explore how histories of science and technology can be useful for scholars and professionals in a wide range of fields and with a wide range of interests. We will not aim for a comprehensive methodological overview of the historiography of science and technology, and we will *definitely* not aim for a comprehensive survey of the history of science and technology. Rather, we will explore a collection of themes and readings that showcase the kinds of questions that histories of science and technology can help you pose and answer. *I am very much open to adjusting latter weeks of our syllabus in order to address topics that we're not currently covering, should any such topics be of strong interest to multiple seminar participants. Please ask!*

This course is designed for graduate students in History, as well as graduate students in other fields of humanities and social sciences with interests in Science and Technology Studies (*aka* Science, Technology, and Society; *aka* STS). Natural science and engineering graduate students eager to explore historical perspectives on their fields are very welcome, as are advanced undergraduates with similar qualifications. Students should have a strong background in either *a*) the methods of History or an allied field of the social sciences or humanities, or *b*) substantial experience in science or engineering is. (Got all of the above? Fabulous! But that's definitely not required.) Above all, you should be excited to do some serious reading, thinking, and discussing.

**Readings:** Each week, we will take up a topic of broad scope and (hopefully) broad-based interest through scholarship addressing this topic vis-à-vis science and technology. We will typically read one book and one or two articles per week. All required books will be available on reserve at the library, and digital versions of all other readings will be available via our course webpage.

**Attendance:** Attendance is vital... but things come up. Everyone gets one absence as a “personal day,” no questions asked. Beyond that, I’m happy to excuse absences due to illness or required University activities, with completion of a make-up exercise contributing to the following week’s discussion.

**Participation and Presentations:** Active participation in seminar discussions is required. Each week, two students will present brief (5 minute) contextual overviews of the week's reading(s), one addressing historical subject matter, the other addressing historiographic, conceptual, and/or theoretical contributions. Each student will present one introduction of each sort during the term.

**Term Project:** As a term project (due on TBD), in groups of approximately three, students will develop an annotated syllabus for an original, semester-long lecture course addressing a topic in the history of science and technology (or otherwise informed by our readings and discussions). Each week's thematic focus would be appropriate as a syllabus topic, although students may choose other topics or design surveys if they wish. As models, we will read and discuss a range of such syllabi in class. *Each group must discuss their syllabus topic and plans with the instructor before our class meeting on Nov 18.*

**Term Project Alternatives:** Students may petition the instructor to pursue one of the following alternative term projects (petitions due via email by 5pm on Friday, Oct 11):

- a) an original research paper of approximately the length and scope of an academic journal article, structured around an episode in the history of science and/or technology;
- b) an original dissertation proposal outlining a full-length research project engaging the methods discussed in this course. This must contain a discussion of existing literature, archives and sources to be consulted, the significance of your study, and the benefits of your proposed approach. (There is no expectation that you will actually select this as your dissertation topic!)
- c) work of similar scope and intellectual rigor that will advance your scholarly interests.

**Grading:** *Participation 50% ■ Term proj. 30% ■ Presentations 10% ■ Just-being-you 10%*

**Required books:** (\* = available as an e-book through Duke Libraries)

- \* Cook, Harold John. *Matters of Exchange: Commerce, Medicine, and Science in the Dutch Golden Age*. New Haven: Yale University Press, 2007.
- Cowan, Ruth Schwartz. *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave*. New York: Basic Books, 1983.
- \* Daston, Lorraine, and Katharine Park. *Wonders and the Order of Nature, 1150-1750*. Cambridge, MA: Zone Books, 1998.
- \* Edwards, Paul N. *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming*. Cambridge, MA: MIT Press, 2010.
- \* Hecht, Gabrielle. *Being Nuclear: Africans and the Global Uranium Trade*. Cambridge, MA: MIT Press, 2012.
- Latour, Bruno. *We Have Never Been Modern*. Trans. Catherine Porter. Cambridge, MA: Harvard University Press, 1993.
- \* Mackenzie, Donald A. *Inventing Accuracy: A Historical Sociology of Nuclear Missile Guidance*. Cambridge, MA: MIT Press, 1990.

- Mullaney, Thomas S. *The Chinese Typewriter: A History*. Cambridge, MA: MIT Press, 2017.
- \* Murphy, Michelle. *Sick Building Syndrome and the Problem of Uncertainty: Environmental Politics, Technoscience, and Women Workers*. Durham: Duke University Press, 2006.
- \* Saraiva, Tiago. *Fascist Pigs : Technoscientific Organisms and the History of Fascism*. Cambridge, MA: MIT Press, 2016.
- \* Shapin, Steven and Simon Schaffer. *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*. Princeton: Princeton University Press, 1985.
- \* TallBear, Kimberly. *Native American DNA: Tribal Belonging and the False Promise of Genetic Science*. Minneapolis: University of Minnesota Press, 2013.
- Wailoo, Keith. *Dying in the City of the Blues: Sickle Cell Anemia and the Politics of Race and Health*. Chapel Hill: University of North Carolina Press, 2001.

### **Week 1 (Aug 26): Introduction**

- What does it mean to think historically about science and technology?
- What can histories of science and technology do for me?

### **Week 2 (Sept 2): Progress**

Readings:

- Cowan, *More Work for Mother*.
- Allan Brandt, "Pro Bono Publico," in *The Cigarette Century* (New York: Basic Books, 2007), 19-43.
- Langdon Winner, "Do Artifacts Have Politics?" *Daedalus* 109, no. 1 (1980): 121-36.

Supplementary:

- Thomas S. Kuhn, *The Structure of Scientific Revolutions*, 4th ed. (Chicago: University of Chicago Press, 2012 [1962]).
- Peter Galison, "The Trading Zone: Coordinating Action and Belief," in *Image and Logic: A Material Culture of Microphysics* (Chicago: University of Chicago Press, 1997), 781-844.
- George Basalla, *The Evolution of Technology* (New York: Cambridge University Press, 1988).
- David Edgerton, *The Shock of the Old: Technology and Global History since 1900* (New York: Oxford University Press, 2007).
- Lee Vinsel and Andrew Russell, "Hail the Maintainers," *Aeon*, April 7, 2016, <https://aeon.co/essays/innovation-is-overvalued-maintenance-often-matters-more>.
- Thomas R. Malthus, *An Essay on the Principle of Population: Influences on Malthus; Selections from Malthus's Work; Economics, Population, and Ethics after Malthus; Malthus and Global Challenges; Malthusianism in Fiction*, ed. Joyce E. Chaplin (New York: Norton, 2018).

### **Week 3 (Sept 9): Facts, alternative facts, and alternatives to facts**

Readings:

- Shapin and Schaffer, *Leviathan and the Air-Pump*.
- Sheila Jasanoff, "Civic Epistemology," in *Designs on Nature: Science and Democracy in Europe and the United States* (Princeton: Princeton University Press, 2005), 247-71.
- William Deringer, "Intrinsic Values: Figuring Out the South Sea Bubble," in *Calculated Values: Finance, Politics, and the Quantitative Age* (Cambridge, MA: Harvard University Press, 2018), 187-226.

## Supplementary:

- Sheila Jasanoff, *States of Knowledge: The Co-Production of Science and Social Order* (New York: Routledge, 2004).
- Ludwik Fleck, *Genesis and Development of a Scientific Fact* (Chicago: University of Chicago Press, 1979 [1935]).
- Mary Poovey, *A History of the Modern Fact: Problems of Knowledge in the Sciences of Wealth and Society* (Chicago: University of Chicago Press, 1998).
- Bruno Latour and Steve Woolgar, *Laboratory Life: The Construction of Scientific Facts*, 2nd ed. (Princeton: Princeton University Press, 1986).
- David Bloor, "The Strong Programme in the Sociology of Knowledge," in *Knowledge and Social Imagery*, 2nd. ed. (Chicago: University of Chicago Press, 1991 [1976]), 3-23.
- Diane M. Nelson, *Who Counts? The Mathematics of Death and Life after Genocide* (Durham: Duke University Press, 2015).
- Rebecca Slayton, *Arguments That Count: Physics, Computing, and Missile Defense, 1949-2012* (Cambridge, MA: MIT Press, 2013).

**Week 4 (Sept 16): Experts**

## Readings:

- Mackenzie, *Inventing Accuracy*.
- H. M. Collins, "The TEA Set: Tacit Knowledge and Scientific Networks," *Science Studies* 4, no. 2 (April 1974): 165-185.
- Fa-ti Fan, "'Collective Monitoring, Collective Defense': Science, Earthquakes, and Politics in Communist China," *Science in Context* 25, no. 1 (March 2012): 127-54.

## Supplementary:

- Michael Polanyi, *Personal Knowledge: Towards a Post-Critical Philosophy* (Chicago: University of Chicago Press, 1958).
- Lucy A. Suchman, *Human-Machine Reconfigurations: Plans and Situated Actions*, 2nd ed. (New York: Cambridge University Press, 2007).
- Harry Collins, *Changing Order: Replication and Induction in Scientific Practice* (Chicago: University of Chicago Press, 1992).
- Scott Gabriel Knowles, *The Disaster Experts: Mastering Risk in Modern America* (Philadelphia: University of Pennsylvania Press, 2011).
- Nathan Ensmenger, *The Computer Boys Take Over: Computers, Programmers, and the Politics of Technical Expertise* (Cambridge, MA: MIT Press, 2010).
- Pamela H. Smith, *The Body of the Artisan: Art and Experience in the Scientific Revolution* (Chicago: University of Chicago Press, 2004).

**Week 5 (Sept 23): Nature**

- Daston and Park, *Wonders and the Order of Nature*.
- Latour, *We Have Never Been Modern*.

## Supplementary:

- Karen Barad, *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning* (Durham: Duke University Press, 2006).
- Donna Haraway, *ModestWitness@SecondMillennium. FemaleManMeetsOncoMouse: Feminism and Technoscience* (New York: Routledge, 1997).
- Banu Subramaniam, *Ghost Stories for Darwin: The Science of Variation and the Politics of Diversity* (Champaign, IL: University of Illinois Press, 2014).

- Carolyn Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution* (New York: Harper, 1980).

### **Week 6 (Sept 30): Bodies and disease**

#### Readings:

- Wailoo, *Dying in the City of the Blues*.
- Charles E. Rosenberg, "Framing Disease," in *Framing Disease: Studies in Cultural History*, ed. Charles E. Rosenberg and Janet Lynne Golden (New Brunswick: Rutgers University Press, 1992), xiii–xvi.
- Emily Martin, "The Egg and the Sperm: How Science Has Constructed a Romance Based on Stereotypical Male-Female Roles," *Signs* 16, no. 3 (1991): 485–501.

#### Supplementary:

- Georges Canguilhem, *On the Normal and the Pathological* (Boston: D. Reidel, 1978 [1943]).
- Jeremy A. Greene, *Prescribing by Numbers: Drugs and the Definition of Disease* (Baltimore: Johns Hopkins University Press, 2007).
- Shigehisa Kuriyama, *The Expressiveness of the Body and the Divergence of Greek and Chinese Medicine* (New York: Zone Books, 1999).
- Katherine Ott, David Serlin, and Stephen Mihm, *Artificial Parts, Practical Lives: Modern Histories of Prosthetics* (New York: NYU Press, 2002).
- Annemarie Mol, *The Body Multiple: Ontology in Medical Practice*, Science and Cultural Theory (Durham: Duke University Press, 2002).
- Pablo F. Gómez, *The Experiential Caribbean: Creating Knowledge and Healing in the Early Modern Atlantic* (Chapel Hill: University of North Carolina Press, 2017).
- Aimi Hamraie, *Building Access: Universal Design and the Politics of Disability* (Minneapolis: University of Minnesota Press, 2017).
- Ruth Rogaski, *Hygienic Modernity: Meanings of Health and Disease in Treaty-Port China* (Berkeley: University of California Press, 2004).

### **FALL BREAK (Oct 7)**

### **Week 7 (Oct 14): Infrastructure and environment**

- Edwards, *A Vast Machine*.
- Thomas Parke Hughes, "The Evolution of Large Technological Systems," in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, ed. Wiebe E. Bijker, Thomas Parke Hughes, and T. J. Pinch (Cambridge, MA: MIT Press, 1987), 51–82.
- Sara B. Pritchard, "Toward an Environmental History of Technology," in *The Oxford Handbook of Environmental History*, by Andrew C. Isenberg (Oxford University Press, 2014), 227–45.
- Gabrielle Hecht, "Interscalar Vehicles for an African Anthropocene: On Waste, Temporality, and Violence," *Cultural Anthropology* 33, no. 1 (2018): 109–41.

#### Supplementary:

- Geoffrey C. Bowker and Susan Leigh Star, *Sorting Things Out: Classification and Its Consequences* (Cambridge, MA: MIT Press, 1999).

- Thomas Parke Hughes, *Networks of Power: Electrification in Western Society, 1880-1930* (Baltimore: Johns Hopkins University Press, 1983).
- Sara B. Pritchard, *Confluence: The Nature of Technology and the Remaking of the Rhône* (Cambridge, MA: Harvard University Press, 2011).
- Gabrielle Hecht, *The Radiance of France: Nuclear Power and National Identity after World War II* (Cambridge, MA: MIT Press, 1998).
- Nikhil Anand, *Hydraulic City: Water and the Infrastructures of Citizenship in Mumbai* (Durham: Duke University Press, 2017).

### **Week 8 (Oct 21): Uncertainty and perspective**

#### Readings:

- Murphy, *Sick Building Syndrome*.
- Donna Haraway, "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective," *Feminist Studies* 14, no. 3 (Autumn 1988): 575-599.
- Eduardo Batalha Viveiros de Castro, "Exchanging Perspectives: The Transformation of Objects into Subjects in Amerindian Ontologies," *Common Knowledge* 10, no. 3 (2004): 463-484.

#### Supplementary (uncertainty, perspective, and objectivity):

- Theodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton: Princeton University Press, 1995).
- Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2007).
- Deborah R. Coen, *Vienna in the Age of Uncertainty: Science, Liberalism, and Private Life* (Chicago: University of Chicago Press, 2007).
- Naomi Oreskes and Erik M. Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (New York: Bloomsbury Press, 2010).
- Sarah E. Igo, *The Known Citizen: A History of Privacy in Modern America*, 2018.

#### Supplementary (science, technology, and architecture):

- Emily A. Thompson, *The Soundscape of Modernity: Architectural Acoustics and the Culture of Listening in America, 1900-1933* (Cambridge, MA: MIT Press, 2004).
- Larry Owens, "Pure and Sound Government: Laboratories, Playing Fields, and Gymnasias in the Nineteenth-Century Search for Order," *Isis* 76, no. 2 (June 1, 1985): 182-94.
- Peter Galison, "Aufbau/Bauhaus: Logical Positivism and Architectural Modernism," *Critical Inquiry* 16, no. 4 (1990): 709-52.

### **Week 9 (Oct 28): Commerce**

#### Readings:

- Cook, *Matters of Exchange*.
- Lorraine Daston, "The Moral Economy of Science," *Osiris* 10 (1995): 2-24.
- Eugenia Lean, "Making the Chinese Copycat: Trademarks and Recipes in Early Twentieth-Century Global Science and Capitalism," *Osiris* 33 (2018): 271-93.

#### Supplementary:

- David Edgerton, "Time, Money, and History," *Isis* 103, no. 2 (June 1, 2012): 316-27.
- Lukas Rieppel, William Deringer, and Eugenia Lean, eds., "Science and Capitalism: Entangled Histories," *Osiris* 33 (2018).

- E. P. Thompson, "Time, Work-Discipline, and Industrial Capitalism," *Past & Present*, no. 38 (December 1, 1967): 56–97.
- William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: Norton, 1991).
- JoAnne Yates, *Control Through Communication: The Rise of System in American Management* (Baltimore: Johns Hopkins University Press, 1993).
- Timothy Mitchell, *Carbon Democracy: Political Power in the Age of Oil* (London: Verso, 2013).

### **Week 10 (Nov 4): Labor, ontology, and agency**

#### Readings:

- Hecht, *Being Nuclear*.
- Michel Callon, "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Briec Bay," *Sociological Review* 32, no. 51 (May 1984): 196-233.
- Zoe Todd, "An Indigenous Feminist's Take on the Ontological Turn: 'Ontology' is Just Another Word for Colonialism," *Journal of Historical Sociology* 29, no. 1 (March 1, 2016): 4–22.

#### Supplementary:

- Steven Shapin, "The Invisible Technician," *American Scientist* 77, no. 6 (November-December 1989): 554-563.
- Gabriela Soto Laveaga, *Jungle Laboratories Mexican Peasants, National Projects, and the Making of the Pill* (Durham: Duke University Press, 2009).
- Jane Bennett, *Vibrant Matter: A Political Ecology of Things* (Durham: Duke University Press, 2010).
- Mel Chen, *Animacies: Biopolitics, Racial Mattering, and Queer Affect* (Durham: Duke University Press, 2012).
- Eve Tuck, "Suspending Damage: A Letter to Communities," *Harvard Educational Review* 79, no. 3 (2009): 409–28.
- Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network Theory* (Oxford: Oxford University Press, 2005).

### **Week 11 (Nov 11): Collections**

#### Readings:

- TallBear, *Native American DNA*.
- Donna Haraway, "Teddy Bear Patriarchy: Taxidermy in the Garden of Eden, New York City, 1908-1936," *Social Text*, no. 11 (December 1, 1984): 20–64.

#### Supplementary:

- Paula Findlen, *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy* (Berkeley: University of California Press, 1996).
- Gabriela Soto Laveaga and Pablo F. Gómez, ed., "Thinking with the World: Histories of Science and Technology from the 'Out There,'" *History and Technology* 34, no. 1 (2018): 1-99.
- Ralph Bauer and Marcy Norton, ed., "Entangled trajectories: Indigenous and European Histories," *Colonial Latin American Review* 26, no. 1 (2017): 1-130.
- Nicholas Jardine, James A. Secord, and Emma C. Spary, eds., *Cultures of Natural History* (New York: Cambridge University Press, 1996).
- James Delbourgo, *Collecting the World: Hans Sloane and the Origins of the British Museum* (Cambridge, MA: Belknap Press, 2017).

**Week 12 (Nov 18): Plants, animals, and politics**

## Readings:

- Saraiva, *Fascist Pigs*.
- Timothy Mitchell, "Can the Mosquito Speak," in *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002), 19-53.

## Supplementary:

- Robert E. Kohler, *Lords of the Fly: Drosophila Genetics and the Experimental Life* (Chicago: University of Chicago Press, 1994).
- Clapperton C. Mavhunga, *The Mobile Workshop: The Tsetse Fly and African Knowledge Production* (Cambridge, MA: MIT Press, 2018).
- Donna Haraway, *The Companion Species Manifesto: Dogs, People, and Significant Otherness* (Chicago: Prickly Paradigm Press, 2003).
- Prakash Kumar et al., "Roundtable: New Narratives of the Green Revolution," *Agricultural History* 91, no. 3 (2017): 397-422.
- Anna Lowenhaupt Tsing, *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins* (Princeton: Princeton University Press, 2015).

**Week 13 (Nov 25): Language**

## Readings:

- Mullaney, *The Chinese Typewriter*.
- Marwa S. Elshakry, "Knowledge in Motion: The Cultural Politics of Modern Science Translations in Arabic," *Isis* 99, no. 4 (December 1, 2008): 701-30.

## Supplementary readings:

- Michael D. Gordin, *Scientific Babel: How Science Was Done Before and After Global English* (Chicago: Chicago University Press, 2015).
- Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences* (New York: Vintage Books, 1994 [1966]).
- Scott L. Montgomery, *Science in Translation: Movements of Knowledge through Cultures and Time* (Chicago: University of Chicago Press, 2000).
- James A. Secord, *Victorian Sensation: The Extraordinary Publication, Reception, and Secret Authorship of Vestiges of the Natural History of Creation* (Chicago: University of Chicago Press, 2000).
- Ann Blair, *Too Much to Know: Managing Scholarly Information before the Modern Age* (New Haven: Yale University Press, 2010).

**Additional topics (some partly addressed in our current readings)**

<i>Numbers and calculation</i>	<i>Disasters</i>	<i>Race</i>
<i>Maintenance</i>	<i>Disability</i>	<i>Books</i>
<i>Violence</i>	<i>Data</i>	<i>Gender and sexuality</i>
<i>Risk</i>	<i>Science and/as political ideology</i>	<i>Science fiction</i>
<i>Cyborgs</i>	<i>Standards and measurement</i>	<i>Classification</i>
<i>Computing</i>	<i>Policing the boundaries of science</i>	<i>The future</i>
<i>Pedagogy</i>	<i>(Inter)nationalism &amp; universalism</i>	<i>Toxicity</i>

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