

# Introduction to Science and Technology Policy Analysis

## Public Policy 650

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Course: Tuesdays 2:30-5:30  
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Science and technology intersect with myriad areas of public policy. Think of the regulatory failures behind patient deaths from Vioxx; the emergence of funding for embryonic stem cell research as a major political issue; the debate over the reality and extent of climate change; and widespread public perception of eroding American research and development competitiveness in a globalizing world. Discussion of these salient issues often turns back to a common set of questions about the relationship between science and policy. Is scientific and technological development a force beyond human control, or can it be governed? Is more and better science necessary for public political decision making? Can only scientists judge the value of scientific research programs or the validity of scientific results? Is the furtherance of scientific understanding always socially benign, and who decides?

This course examines such questions by surveying the variety of interactions between science, technology, and policy, focusing primarily on the American context, but also including comparative perspectives. The approach is multidisciplinary, drawing upon literature in a wide range of disciplines including political science, philosophy, economics, sociology, and history. It will provide students:

- Background on science and technology policy environment
- Multidisciplinary toolkit for thinking about science and technology policy
- Multidisciplinary methods for influencing science and technology policy
- Understanding of the “social science” of science and technology policy
- Expertise in conducting and presenting policy analysis



PubPol 650 is a core course in the Science, Technology, and Public Policy (STPP) Graduate Certificate Program. It is designed for graduate students from diverse backgrounds, including public policy, public health, law, business, engineering and the social, biological, and physical sciences. No scientific or technical background is necessary. A basic understanding of the concepts of American government is very helpful, but not strictly required.

### Course Requirements

1. ***Class preparation, attendance, and participation.*** You need to do the weekly readings and come to class prepared to discuss them. This preparation should not simply be a passive process of absorbing facts; rather, while reading, you should actively identify (and write down!) questions you have, possible avenues of discussion, and potential points of application of the readings to current events. Along these lines, I would encourage students to scan the headlines of science journals (e.g., Scientific

American, [www.scientificamerican.com](http://www.scientificamerican.com); or the New York Time's Tuesday Science Times, [www.nytimes.com](http://www.nytimes.com)) to seek application for the week's readings. (10% of grade)

2. **Reading Responses.** To assist you in fulfilling (1), during the course of the semester, I would like you to produce six (6) reading response memos of roughly a page (single spaced) each. These do not need to be fancy! They could even be a simple list of insights or questions derived from the readings. They should be opportunities to refine questions and insights from the readings. You can also use these to explore ideas relevant to your policy analysis exercise (see point 3 below). They should be submitted to me *at least two hours before the start of class* on the week the readings will be discussed; I will draw on them to frame discussion and steer the conversation toward areas of use to you. (20% of grade).
3. **Policy Analysis Exercise.** This is the major assignment for the course, and accounts for 70% of your grade in its several components. Students will be asked to choose a facet of current science and technology policy (e.g., a program, a regulation, an oversight body) and then complete a series of assignments that, taken together, could be used to brief a policymaker. For suggestions on the kind of topics you might consider, see the list at the end of this syllabus (definitely not exhaustive). The components of the exercise are as follows. More detailed guidelines will be handed out as the due dates approach:
  - a. **Background memo.** *Due by 17 October; maximum of 4 pages single spaced; worth 10% of your grade.* Here you should give your hypothetical policymaker some context by examining some or all of the following questions. Why was the policy enacted? Who were the major players in the politics surrounding the controversy? What problem does the policy purport to solve? Is there controversy about the policy? If so, what is the nature of the policy and who is involved?
  - b. **Policy assessment.** *Due by 20 November in class; maximum of 4 pages single spaced; worth 20% of your grade.* Policy assessments go beyond backgrounders by examining the value outcomes of a policy – constituencies served, benefits, effectiveness, and so forth. Whom does this policy serve, or not serve? What values does it uphold or fail to uphold? Is the policy effective in meeting its stated goals? On what grounds is the policy “good” or “bad”?
  - c. **Final paper.** *Due by 18 December at noon; maximum of 12 pages single spaced; worth 30% of your grade.* The paper should revise and expand upon your earlier backgrounder and policy assessment, based on my feedback on those assignments. In addition, it will also contain a section that focuses on how your policy might be improved.
  - d. **Presentation.** *To be given in-class during the exam period; approximately 8 minutes duration; worth 10% of your grade.* This will lay out your policy problem and make a terse argument for your proposed changes in policy. The challenge will be to make good use of the relatively short time allotted. Bring whatever slides or visual materials you think will be helpful and appropriate.

## Course Readings

Five books are required (available at any of the campus bookstores, and on reserve in the FSPP reading room).

Thomas Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1996).

Daniel Greenberg, *Science, Money, and Politics: Political Triumph and Ethical Erosion* (Chicago: University of Chicago Press, 2003).

Daniel Kleinman, *Politics on the Endless Frontier* (Durham, NC: Duke University Press, 1995).

Chris Mooney, *The Republican War on Science* (New York: Basic Books, 2005).

Sheila Jasanoff, *The Fifth Branch: Science Advisers as Policymakers* (Cambridge, MA: Harvard University Press, 1998).

Other readings will be available on Ctools.

#### **4 September. Introduction: Aims, Themes, Mechanics**

#### **11 September. What is Science, and how does it Work?**

Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962). (Complete.)

Sheila Jasanoff, "Is Science Socially Constructed -- And Can It Still Inform Public Policy?," *Science and Engineering Ethics* 2.3 (1996) pp. 263-276.

#### **18 September. The Evolution of Science and Technology Policy in the U.S.**

NOTE: Choice of policy issue due!

Daniel Kleinman, *Politics on the Endless Frontier: Postwar Research Policy in the United States* (Durham, NC: Duke University Press, 1995), chapters 2-6.

Vannevar Bush, *Science: The Endless Frontier. A Report to the President* (Washington, DC: U.S. Government Printing Office, 1945). (For reference only.)

Daniel S. Greenberg, *Science, Money, and Politics: Political Triumph and Ethical Erosion* (Chicago: University of Chicago Press, 2001). Introduction, chapters 1-6.

#### **25 September. Contemporary Controversies in S&TP**

In class we'll walk through some examples of controversies in S&TP, focusing on certain projects in high-energy physics and the recent uproar over stem cells. Also note that our first installment of the fall 2007 STPP lecture series will be presented on Monday, 1 October from 4-5:30 pm in the Betty Ford Classroom. The speaker, Dr. Linda Hogle, will discuss the regulatory environment for stem cell research and tissue engineering.

Daniel S. Greenberg, *Science, Money, and Politics: Political Triumph and Ethical Erosion* (Chicago: University of Chicago Press, 2003), chapters 10-14, 28.

Daniel Kevles, "The Death of the Superconducting Supercollider in the Life of American Physics," in Kevles, *The Physicists: A Scientific Community in Modern America* (Cambridge: Harvard University Press, 1995).

Chris Mooney, *The Republican War on Science* Ch. 12, "Stemming Science," pp. 195-216. Also compare Mooney's history of science-politics interactions (given in his chapters 3-5) with Greenberg's account.

## **2 October. Rethinking the "Social Contract" for Science**

Lecture: case studies of cancer research, the evolution of the US global change research program.

Daniel Kleinman, *Politics on the Endless Frontier: Postwar Research Policy in the United States* (Durham, NC: Duke University Press, 1995), Chapter 7.

Daniel Sarewitz, "Human Well-being and Federal Science—What's the Connection", in D. L. Kleinman, ed., *Science, Technology, and Democracy* (Albany: SUNY Press, 2000), pp. 87-102.

Barry Bozeman and Daniel Sarewitz, "[Public values and public failure in US science policy.](#)" *Science and Public Policy* 32.2 (April 2005) pp. 119-136.

Daniel Sarewitz et al., "[Science Policy in Its Social Context.](#)" *Philosophy Today* 2004 Supplement, 67-83.

Robert Frodeman and Carl Mitcham "Beyond the Social Contract Myth." *Issues in Science and Technology* 2000.

David Guston, "Integrity, Responsibility, and Democracy in Science." *Scipolicy*. 1.2 (2001) pp. 168-189.

## **9 October. Sociology of Innovation**

Thomas P. Hughes, "The Evolution of Large Technological Systems," in *The Social Construction of Technological Systems* eds. Wiebe Bijker et al. (Cambridge, MA: MIT Press, 1987), pp.51-82.

Trevor Pinch and Ronald Kline, "Users as Agents of Technological Change: The Social Construction of the Automobile in the Rural United States," *Technology and Culture* 37 (1996), pp.763-795.

Donald Mackenzie, "Nuclear Missile Testing and the Social Construction of Accuracy." *The Science Studies Reader* ed. Mario Biagoli (New York: Routledge, 1999), Chapter 23.

Bruno Latour, "Where are the missing masses? The Sociology of a Few Mundane Artifacts" in *Shaping Technology/Building Society: Studies in Sociotechnical Change*, eds. Wiebe Bijker and John Law (Cambridge, MA: MIT Press, 1992).  
<http://ets.umdl.umich.edu/cgi/t/text/pageviewer->

[idx?c=acls;cc=acls;rgn=full%20text;idno=heb01128.0001.001;didno=heb01128.0001.001;view=image;seq=00000237;node=heb01128.0001.001%3A17](http://www.library.utoronto.ca/ocw/ocw-101/ocw-101-01/view=image;seq=00000237;node=heb01128.0001.001%3A17)

Jameson Wetmore, "Redefining Risks and Redistributing Responsibilities: Building Networks to Increase Automobile Safety." *Science, Technology, and Human Values*. 29.4 (2004): 377-405.

Langdon Winner, "Do Artefacts have Politics?" in Winner (ed.), *The Whale and the Reactor: A Search for Limits in an Age of High Technology* (1986), pp.19-39.

### **17 October. BACKGROUND MEMO DUE (NO MEETING ON 16 OCTOBER).**

#### **23 October. Understanding Technology Assessment**

In the first hour of class we will conduct a live videoconference with David Guston (Arizona State University) on the work of his organization, the Center for Nanotechnology and Society.

David Guston and Daniel Sarewitz, "Real-time technology assessment." *Technology in Society* 24 (2002): 93-109.

Johan W. Schot, "Constructive Technology Assessment and Technology Dynamics: The Case of Clean Technologies." *Science, Technology, & Human Values*. 17(1): 36-56.

Michael Rodemeyer, Daniel Sarewitz, and James Wilsdon (2005). "The Future of Technology Assessment." *Woodrow Wilson International Center for Scholars Foresight and Governance Project*.

DEMOS, *Governing at the Nanoscale: People, Policies, and Emerging Technologies* (London, 2006).

#### **30 October. Development and Technology Transfer**

William Easterly, "The Ideology of Development" *Foreign Policy* July/August 2007, pp. 31-35.

James C. Scott, "Taming Nature: An Agriculture of Legibility and Simplicity" in Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition have Failed* (New Haven: Yale University Press, 1998), pp. 262-306.

Sanjeev Khagram, "India's Narmada Projects" in Khagram, *Dams and Development: Transnational Struggles for Water and Power* (Ithaca: Cornell University Press, 2004), pp. 65-100.

Clark Miller, "Resisting Empire" in *Earthly Politics* eds. Sheila Jasanoff and Marybeth Long Martello (Cambridge, MA: MIT Press, 2004), pp. 81-102.

#### **6 November. "Scientific" Controversies**

Daniel Sarewitz, "How Science Makes Environmental Controversies Worse" *Environmental Science and Policy* 7(2004): 385-403.

Roger Pielke, "When Scientists Politicize Science." *Regulation* (2006), pp. 28-34.

Thomas Gieryn, *Cultural Boundaries of Science: Credibility on the Line* (Chicago: University of Chicago Press, 1999), Chapter 4.

Dorothy Nelkin, "Science Controversies: The Dynamics of Public Disputes in the United States." *Handbook of Science & Technology Studies* eds. Sheila Jasanoff, Gerald E. Markle, James C. Peterson, and Trevor Pinch (Thousand Oaks, CA: Sage Publications, 1995).

Dorothy Nelkin and James M. Jasper, "The Animal Rights Controversy." *Controversy: The Politics of Technical Decisions*, ed. Dorothy Nelkin (Newbury Park, CA: Sage Publications, 1991).

### **13 November. Structures of Science Advising**

Sheila Jasanoff, *The Fifth Branch: Science Advisers as Policymakers* (Cambridge, MA: Harvard University Press, 1998), selections.

### **20 November. Contemporary Problems in Science Advising and Policymaking**

#### **NOTE: POLICY ASSESSMENT DUE.**

Class exercise: evaluating current directions in reform of science advising, including oversight legislation and proposals to reinstitute the Office of Technology Assessment.

Chris Mooney, *The Republican War on Science* (New York: Basic Books, 2006), chapters 6-10, and epilogue, "What We Can Do."

Daniel Sarewitz, "Scientizing Politics: The Republican War on Science" *Issues in Science and Technology* Winter 2006.

Derek Araujo, Daniel Horowitz, and Ronald Lindsay, "Protecting Scientific Integrity" May 2007. (Draft Legislation on reform of federal science advising procedures; see [http://www.centerforinquiry.net/advocacy/protecting\\_scientific\\_integrity/](http://www.centerforinquiry.net/advocacy/protecting_scientific_integrity/))

### **27 November. Experts and the Public**

[read in order]

Brian Wynne, "Misunderstood misunderstandings: Social Identities and Public Uptake of Science" in *Misunderstanding Science?* Edited by Alan Irwin and Brian Wynne (Cambridge: Cambridge University Press, 1996).

Steven Epstein, "The Construction of Lay Expertise: AIDS Activism and the Forging of Credibility in the Reform of Clinical Trials," *Science, Technology, & Human Values* 20.4 (1995): 408-437.

Sheila Jasanoff, "Civilization and madness: The great BSE scare of 1996," *Public Understanding of Science*.6.3 (1997): 221-232.

Daniel Kleinman, ed., *Science, Technology, and Democracy* (Albany, NY: SUNY Press, 2000), Chapters 3, 4.

#### **4 December. The Management of Risk and Uncertainty**

- Jasanoff, Sheila (1991). "Acceptable Evidence in a Pluralistic Society." In *Acceptable Evidence: Science and Values in Risk Management*. New York: Oxford University Press.
- S.O. Funtowicz and J.R. Ravetz, "Three Types of Risk Assessment and the Emergence of Post-Normal Science" in Krimsky and Golding, eds., *Social Theories of Risk* (Westport, CT: Praeger, 1992), pp. 251-274.
- David Vogel, "The Politics of Risk Regulation in Europe and the United States" *European Handbook of Environmental Law* Vol. 3 (Oxford: Oxford University Press, 2003), pp. 1-42.
- Patrick van Zwanenberg and Andrew Stirling, "Risk and Precaution in Europe: A Response to Vogel" *European Handbook of Environmental Law* Vol. 3 (Oxford: Oxford University Press, 2003), pp. 43-56.
- Steve Rayner, "Prediction and Other Approaches to Climate Change Policy" in Sarewitz et al., *Prediction: Science, Decision Making, and the Future of Nature* (Washington, DC: Island Press, 2000).

#### **11 December. Sociotechnical Breakdowns**

- Charles Perrow, *Normal Accidents* (New York: Basic Books, 1984), Introduction and Chapter 1.
- Diane Vaughan, "Organizational Rituals of Risk and Error." In *Organizational Encounters with Risk* Eds. Bridget Hutter and Michael Power (New York: Cambridge University Press, 2004).
- Jameson Wetmore, "Distributing Risks and Responsibilities: Flood Hazard Mitigation in New Orleans" *Social Studies of Science*, forthcoming.
- Stephen Hilgartner, "Overflow and Containment in the Aftermath of Disaster." *Social Studies of Science*, forthcoming.
- Neil Smith, "There's No Such Thing as a Natural Disaster." *SSRC Forum*, 2005  
<http://understandingkatrina.ssrc.org/>

#### **18 December: Democratizing Science and Technology**

- Kleinman, Daniel, *Science, Technology, and Democracy* (Albany: SUNY Press, 2000), Chapters 2, 6.
- Simon Joss and Arthur Brownlea. "Considering the concept of procedural justice for public policy—and decision-making in science and technology." *Science and Public Policy*. 26.5: 321-330.
- Mark Brown, "Survey Article: Citizen Panels and the Concept of Representation." *The Journal of Political Philosophy* 14.2 (2006): 203-225.
- Colin Finney, "Extending public consultation via the Internet: the experience of the UK Advisory Committee on Genetic Testing electronic consultation." *Science and Public Policy* 26.5 (1999): 361-373.

**FINAL PAPER (INCLUDING POLICY INTERVENTION) DUE: Tuesday, 18  
December in Class**

**FINAL PRESENTATIONS: Wednesday, 19 December, 1:30-3:30 p.m.**



**Choosing A Topic for Policy Analysis:**

1. Choose a general policy issue
2. Do some initial research, find a specific policy.

**Examples:**

National Nanotechnology Initiative

NIH National Center for Complementary and Alternative Medicine

Endangered Species Act

CDC Mammographic Screening guidelines

FDA approval of Plan B

Federal policy on stem cell research

Federal policy on cloning

CA stem cell initiative

UN Convention on Biological Diversity

Kyoto Protocol on Climate Change

Net neutrality bill

Clean Air Act

Great Lakes Consortium

Organic food labeling law

Genetically modified food regulation (in the US or abroad)

USDA's food pyramid(s)

India's clinical trial regulations