

Science and Technology Policy
Syllabus for ENVS 5100
University of Colorado – Spring 2010

Roger A. Pielke, Jr., Professor
Mondays 12:00-2:30 PM
GUGG 201E

Course Homepage:
http://sciencepolicy.colorado.edu/students/envs_5100/

Office Hours: Mondays 10-11:30AM and by appointment
Office Location: CIRES Center for Science and Technology Policy,
1333 Grandview Ave.
Phone: 303-735-3940 (note: to reach me, email always better than
phone)
email: pielke@colorado.edu

Overview and Purpose of the Course

The National Research Council posits that universities today “have a double duty:”

to educate and train not only those who will have careers in research, but also those who will become entrepreneurs, managers, consultants, investors, or policy makers. Universities also can play a more active role in helping students to prepare for these roles.¹

And the American Association for the Advancement of Science observes that to improving national science policy,

Above all, we in the research community must find ways to link R&D priority decisions more effectively to societal goals without compromising scientific excellence and the autonomy of individual researchers.²

To help fill this need, in 2003 the University of Colorado approved a new educational program to prepare students pursuing graduate degrees for careers at the intersection of science, technology and decision making. This course is the first in a 3-course sequence within the Graduate Certificate Program in Science and Technology Policy. It is also open to anyone else interested in learning about science and technology policy.

¹ NRC, 1999. Capitalizing on Research in Science and Technology, Committee on Science, Engineering, and Public Policy, National Academy Press. Quote from Chapter 5, <http://books.nap.edu/html/capital/chap5.html>

² AAAS, 1998. A framework for federal science policy, Board of Directors, American Association for the Advancement of Science, May, <http://www.aaas.org/spp/fedsci/boardrpt.htm>

Graduate study provides students with an opportunity to gain expertise within a particular disciplinary or interdisciplinary specialty.³ Such expertise is essential to the processes of creating new knowledge and integrating existing knowledge to produce novel insights.

But society looks to experts to do more than conduct research and produce knowledge. Increasingly, society looks to experts to play a central role in securing the benefits of the nation's investment in knowledge, while at the same time, helping to protect against the misuse or unintended consequences of science and technology. In short, society expects experts to play a central role in improving decision making in public, private and civic settings.

But society needs experts to do more than simply provide knowledge. Increasingly, experts must play a central role in helping society to secure the benefits of society's investment in knowledge, and in helping to protect against the misuse or unintended consequences of knowledge. More specifically, the expert must do more than provide knowledge to the decision process from a distance; the expert must participate in the process to help ensure that good outcomes result.

Science and technology result in a broad range of impacts on society. The impacts can be positive, such as the advances in health care over the twentieth century, or they can be negative, such as in the prospect of a terrorist attack using biological agents. The impacts of science and technology on society depend on the decisions we make and decision processes we implement for the governance of science and technology. Given the central role played by science and technology in modern society it is critical to develop expertise at the interface of science, technology and decision making.

Society's demand for more useful and more relevant research is a message that has been heard loud and clear by the scientific community, with resulting calls for an evolution of graduate education. For example, according to a report of the National Research Council, society today expects those with advanced graduate training, "to contribute to new debates on public policy, to improve our competitive position in global markets, to help to create high-value jobs, and to improve the education of citizens at many levels."⁴

But in this context, Chubin (2000) identified science and technology policy as an important area needing attention by educators.

³ The National Research Council uses the following taxonomy to describe areas of graduate study: physical, mathematical sciences and engineering, life sciences, social sciences, law, journalism and humanities.

⁴ NRC, 1995. Reshaping the Graduate Education of Scientists and Engineers, Committee on Science, Engineering, and Public Policy, National Academy Press. Quote from Chapter 1, <http://bob.nap.edu/html/grad/chapter1.html>

If we do not replenish a cadre of S&T-savvy analysts, anecdotes will dominate policy debates. While the science community mulls about the composition of its future workforce, it must also help produce the next generation of S&T policy analysts and politically conscious citizens. Between public policy/administration programs and "science and technology (S&T studies)" programs, there should be a diverse pool of potential analysts being trained and then connected, as a career choice, to the apparatus of federal policymaking.⁵

Yet, recognizing demand for improved connections of science and society and asserting its importance is not the same as meeting that demand. Michael Crow, President of Arizona State University, notes of the connections between science and decision making, "successful linkages between the two have been extremely difficult to forge." He further observes

We devote very little intellectual energy toward improving our incomplete understanding of the science-policy interface and the institutions focusing on this interface. Our scientific and technical abilities far outstrip our decision making methods and ability to understand the relationship between science and its many outcomes.⁶

This course seeks to introduce students to science and technology policy research and as a result, set the stage for improved understandings of science and technology, and their broader outcomes in society.

Requirements of the Course

Seminar Format

The course is a seminar, which means that we each share responsibility for pedagogy. There are a considerable amount of readings in the course and consequently the course has been structured in a way to allow for sharing responsibility for learning. The formal requirements of the course include informal weekly one pagers, 3 weeks of student-led "book club" discussions, 2 major in-class projects, recommended attendance at several outside-class events and an individual term project.

Readings

⁵ Chubin, D. 2000. Filling the policy vacuum created by OTA's demise, *Issues in Science and Technology Policy*, Winter, <http://www.nap.edu/issues/17.2/stalk.htm>

⁶ M. Crow. 2001. Linking Scientific Research to Societal Outcomes, Chapter 10 pp. 129-131 in A. Teich et al. (eds.) **AAAS Science and Technology Policy Yearbook** (American Association for the Advancement of Science, Washington, DC). <http://www.aaas.org/spp/rd/ch10.pdf>

There are a lot of readings for this class, and many more will be made available for those interested in pursuing issues further. All required articles will be made available either by email or from the course WWW site, and most in PDF or HTML format. Copies of required books will be available on reserve in the library.

There are 2 required books that we will read for the class:

Greenberg, D. 2001. **Science, Money, and Politics**, University of Chicago Press.

Pielke, Jr. R. A. 2007. **The Honest Broker: Making Sense of Science in Policy and Politics** (Cambridge University Press: Cambridge, UK).

Students will together decide on a third required book to be read and discussed in class. I suggest getting these online, and used books can be cheaper. Also there are certainly copies floating around from past classes that might be borrowed. If anyone requests it, I will be happy to place the books on reserve in the library.

Guest Speakers

As opportunities allow we may have a few guest speakers lined up. Please feel free to suggest speakers for the class.

Weekly One Pagers

Every week you are expected to turn in a one-page essay (there are a few exceptions, please see the assignment tracking table for details). The essay will be due every **Thursday** to be submitted via the course email list-serv:

envs5100@sciencepolicy.colorado.edu

You might consider addressing the following two items in your submission:

1. The most important thing I learned from the class discussion and/or readings was . . .
2. The thing I still don't understand is . . .

You are of course free to discuss any topic related to the class beyond these two questions as well.

The purpose of this exercise is to allow you an opportunity to discuss aspects of the readings, integrate other material with the week's focus, or to raise questions about what was unclear or unanswered by the readings. A secondary purpose is to ensure that you have an opportunity to provide me with feedback on the readings and your progress/satisfaction in the course.

Periodic Assignments

There will be periodic assignments throughout the term. In particular there are two major class projects, one focused on budgeting and the other focused on scientific advice to policy makers.

Book club

Each of you will be asked to share responsibility for leading discussion for one of the three “book club” discussions. Since there are 3 books to be read that means that 1/3 of the class will lead each discussion. You are free to organize the class in whatever manner makes sense and you are free to add supplementary materials to the readings. Some ideas are preparation of “reader’s guides” to the week’s readings, role play, field trip, invited guest, lecture, questions posed for discussion, etc. You are free to assign a deliverable (e.g., short paper) to the class.

Outside Events

There are a wide range of science and technology policy events always going on in Boulder. This spring we will have a seminar series organized by the Center for Science and Technology Policy Research. I’d like you to attend 2 additional events outside of class, and encourage you provide a report back to the class on the event and its relationship to class themes. Hopefully, you’ll have a chance to attend more than two such events.

Individual Term Projects

You will be responsible for completing a semester-long project focused on preparing a literature review. The result is to be a paper. I will discuss the details further in class. I would like a 1 page description of your final project by **February 15**.

Grading

Your grade will be determined as based on an evaluation of your work performed with respect to all of the above.

Assignment Tracking Table

This is provided to help you manage what is due when

DATE	ASSIGNMENT DUE	
1. 11 January	-	
2. 18 January	NO CLASS 1-pager (1/21)	
3. 25 January	1-pager (1/28)	
4. 1 February	1-pager (2/4)	
5. 8 February	1-pager (2/11) Budget Assignment Due in Class	
6. 15 February	1-pager (2/18) BOOK CLUB 1 Final Project Proposal Due in Class	
7. 22 February	1-pager (2/25)	
8. 1 March	BOOK CLUB 2 1-pager (3/4)	
9. 8 March	1-pager (3/11)	
10. 15 March	BOOK CLUB 3 1-pager (3/18)	
11. 22 March	NO CLASS Spring break	
12. 29 March	1-pager (4/1)	
13. 5 April	1-pager (4/8)	
14. 12 April	1-pager (4/15) Advisory Committee Group Assignment Due in Class	
15. 19 April	1-pager (4/22)	
16. 26 April	TERM PROJECTS DUE	

Tentative Schedule and Readings

Week 1 – January 11 – Introduction, Overview

Welcome to the Class
Introductions
Overview of the Syllabus
Schedule

First Introduction to the Course Themes
What you should be reading on a regular basis

Week 2 – January 18 – No Class MLK Day!

Introduction to Course Themes

D. Sarewitz, 2009. The rightful place of science, *Issues in Science and Technology*, summer.

<http://www.issues.org/25.4/sarewitz.html>

Brooks, H. 1995. The Evolution of U.S. Science Policy, in B. Smith and C. Barfield (eds.), *Technology, R&D, and the Economy*, Washington, DC: Brookings Institution, p. 15-47.

J. Stilgoe, J. Wilsdon, and B. Wynne, 2005. The Public Value of Science, Or how to ensure that science really matters, DEMOS, London, UK,

<http://www.demos.co.uk/catalogue/publicvalueofscience/>

Pielke, Jr., R. A., 2002: Policy, politics and perspective. *Nature* 416:368.

http://sciencepolicy.colorado.edu/admin/publication_files/2002.05.pdf

WEEKS 3-5 FEDERAL BUDGET UNIT

Week 3 – January 25 – Federal Budget Process I

Budget assignment handed out

AAAS REPORT XXXIV
RESEARCH AND DEVELOPMENT
FY 2010

<http://www.aaas.org/spp/rd/rdreport2010/>

Additional general readings on the budget:

U.S. House of Representatives, Committee on the Budget, 1995. *The Congressional Budget Process: An Explanation*, 105-67.

GAO, 1996: *Managing for Results: Key Steps and Challenges in Implementing GPRA in Science Agencies*, GAO/T-GGD/RCED-96-214 z. Washington, DC: US GPO.

Budget-related WWW sites:

<http://www.cbo.gov/>

<http://www.whitehouse.gov/omb/>

<http://www.senate.gov/~budget/democratic/budprocess.html>

<http://www.whitehouse.gov/omb/budget/fy2010/>

<http://www.house.gov./budget/>

http://www.house.gov/budget_democrats/

<http://www.senate.gov/~budget/democratic/>

<http://www.senate.gov/~budget/republican/>

Week 4 – February 1 – Federal Budget Process II

IN CLASS BUDGETING WORKSHOP

Week 5 – February 8 – Federal Budget Process III

Budget assignments due and discussion

Week 6 – February 15 – Book Club 1

Greenberg, D. 2001. **Science, Money, and Politics**, University of Chicago Press.

Final Project Proposal Due in Class

Week 7 – February 22 -- Historical Perspectives on Science Policy

Calvert, J. 2006. What's Special about Basic Research? *Science, Technology & Human Values* **31**: 199-220.

Polanyi, M., 1967. The Republic of Science, *Minerva*, **1**: 54-73

Nelson, Richard. 1959. "The Simple Economics of Basic Scientific Research" *Journal of Political Economy* **67**: 297-306.

Pielke, Jr., R.A., and R. Byerly, Jr., 1998: Beyond basic and applied. *Physics Today*, 51(2), 42-46.

David King, 2004. Scientific Impact of Nations
http://www.ost.gov.uk/about_ost/Nature_Article_15_July_FINAL.pdf

Optional:

Ehlers, Vern, Unlocking Our Future: Toward a New National Science Policy, 1998,
at: http://www.house.gov/science/science_policy_report.htm

Vannevar Bush, *Science the Endless Frontier, A Report to the President*, July 1945, at:
<http://www.nsf.gov/od/lpa/nsf50/vbush1945.htm>

Kevles, D. 1987. Chapter 21, The Bomb and Postwar Research Policy, and Chapter 22, Victory for Elitism, pp. 325-366 in **The Physicists** (Cambridge: Harvard University Press).

White, L. T. 1962. Stirrup, Mounted Shock Combat, Feudalism, and Chivalry, Chapter 1, pp. 1-38., **Medieval Technology and Social Change** (London: Oxford University Press).

Week 8 – March 1 -- Book club 2

Reading TBD

Week 9 – March 8 – What are universities for?

Michael M. Crow and Christopher Tucker. “The American Research University as America’s *de facto* Technology Policy.” *Science and Public Policy* 28(1):1-9.

Coleman, M.S. 2007. Partner or Perish—Universities as Agents of Change. *AAAS-CSPO S&T Policy Review: Highlights of the 2007 Forum on S&T Policy*.

Florida, R. 1999. The role of the university: Leveraging talent, not technology. *Issues in Science and Technology*. Online at: www.issues.org/15.4/florida.htm

Press, E. and Washburn, J. 2000. The Kept University. *Atlantic Monthly*, March 2000.39-54

Rosenberg, N. and Nelson, R.R. 1994. American universities and technical advance in industry. *Research Policy* 23:323-348

Rafferty, M. 2008. The Bayh-Dole Act and university research and development. *Research Policy* 37:29-40

Bhattacharjee, Y. 2007. New analysis questions push for more degrees. *Science* 318:1052

Week 10 – March 15 – Book Club 3

Pielke, Jr. R. A. 2007. **The Honest Broker: Making Sense of Science in Policy and Politics** (Cambridge University Press: Cambridge, UK).

Week 11 – March 22

SPRING BREAK

ENJOY!!

WEEKS 13-14 UNIT ON SCIENCE ADVICE TO DECISION MAKERS

Week 12 – March 29 – Science Advice to Decision Makers

Assign science advisory project

Bipartisan Policy Center, 2009. Improving the use of science in regulatory policy, Science for Policy Project, Washington DC.

<http://www.bipartisanpolicy.org/sites/default/files/BPC%20Science%20Report%20fnl.pdf>

Brown, M. "Fairly Balanced: The Politics of Representation on Government Advisory Committees," *Political Research Quarterly* 61, no. 4 (2008): 547-560.

<http://prq.sagepub.com/cgi/content/abstract/61/4/547>

Pielke, Jr., R. A. and R. Klein, 2009. The Rise and Fall of the Science Advisor to the President of the United States. *Minerva*, DOI 10.1007/s11024-009-9117-3.

http://sciencepolicy.colorado.edu/admin/publication_files/resource-2719-2009.05.pdf

DEMOS, 2006. The Received Wisdom

<http://www.demos.co.uk/files/receivedwisdom.pdf>

Optional additional readings:

National Research Council, 2004. Science and Technology in the National Interest: Ensuring the Best Presidential and Federal Advisory Committee Science and Technology Appointments, <http://books.nap.edu/html/national-interest/0309092973.pdf>

U.S. GAO, 2004. FEDERAL ADVISORY COMMITTEES: Additional Guidance Could Help Agencies Better Ensure Independence and Balance, <http://www.gao.gov/new.items/d04328.pdf>

Federation of American Scientists, 2004. Flying Blind: The Rise, Fall, and Possible Resurrection of Science Policy Advice in the US, <http://www.fas.org/resource/12022004142618.pdf>

U.S. GAO, 2004. Legal Principles Applicable to Selection of Federal Advisory Committee Members, B-303767, October 18, 2004. <http://www.gao.gov/decisions/other/303767.pdf>

Pielke, Jr., R. A. 2005. Accepting politics in science, The Washington Post, January 10, p. A17. http://sciencepolicy.colorado.edu/admin/publication_files/resource-1706-2005.13.pdf

Week 13 – April 5 – – In-class science advice workshop

Week 14 – April 12 – Science Advisory Committees presentations and debate

Week 15 – April 19 -- Course wrap up: Science and Technology Policy Research

Guston, D. H., Retiring the Social Contract for Science, *Issues in Science and Technology*, Summer 2000, at: http://www.nap.edu/issues/16.4/p_guston.htm

Sarewitz, D., 2000. Human Well-being and Federal Science—What's the Connection, in D.L. Kleinman, ed., *Science, Technology, and Democracy* (Albany: SUNY Press), pp. 87-102, at: <http://www.cspo.org/products/articles/human.well.being.html>

Jasanoff, S. 1999. STS and Public Policy: Getting Beyond Deconstruction, *Science, Technology and Society*, 4:59-72.

M. Crow. 2001. Linking Scientific Research to Societal Outcomes, Chapter 10 pp. 129-131 in A. Teich et al. (eds.) *AAAS Science and Technology Policy Yearbook* (American Association for the Advancement of Science, Washington, DC). <http://www.aaas.org/spp/rd/ch10.pdf>

Clark W. C. and G. Majone, 1985. The Critical Appraisal of Scientific Inquiries with Political Implications, *Science, Technology, and Human Values*, 10:3:6-19.

Optional

Kitcher, Philip, **Science, Truth, and Democracy** (NY: Oxford University Press) 2001.

Hilgartner, S. 2000. **Science on Stage**, Stanford University Press.

Sarewitz, D. 1996. **Frontiers of Illusion**, Temple University Press,.

Week 16 -- April 26 - Final presentations

University Syllabus Statements

If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner so that your needs may be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Willard 322, and www.Colorado.EDU/disabilityservices

Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, {{insert your procedures here}} See full details at http://www.colorado.edu/policies/fac_relig.html

Students and faculty each have responsibility for maintaining an appropriate learning environment. Students who fail to adhere to such behavioral standards may be subject to discipline. Faculty have the professional responsibility to treat all students with understanding, dignity and respect, to guide classroom discussion and to set reasonable limits on the manner in which they and their students express opinions. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. See polices at

<http://www.colorado.edu/policies/classbehavior.html> and at http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code

The University of Colorado at Boulder policy on Discrimination and Harassment (<http://www.colorado.edu/policies/discrimination.html>), the University of Colorado policy on Sexual Harassment and the University of Colorado policy on Amorous Relationships applies to all students, staff and faculty. Any student, staff or faculty member who believes s/he has been the subject of discrimination or harassment based upon race, color, national origin, sex, age, disability, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the ODH and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at <http://www.colorado.edu/odh>

All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall

be reported to the Honor Code Council (honor@colorado.edu; 303-725-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at <http://www.colorado.edu/policies/honor.html> and at <http://www.colorado.edu/academics/honorcode/>.