

Science and Technology Policy
Syllabus for ENVS 5100
University of Colorado – Spring 2012

Roger A. Pielke, Jr.
Mondays 12:00-2:30 PM

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

Office Hours: Mondays 10-11:30AM and by appointment
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Overview and Purpose of the Course

The National Research Council posits that universities “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. The course is also open to anyone interested in learning more about science and technology policy.

This year’s course is going to focus on the theme of “responsible science” (described below.)

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 you 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 increasingly to experts to do more than conduct research and produce knowledge -- 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 contribute to decision making in public, private and civic settings.

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 disease escaping a lab and infecting millions of people. 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 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.

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,

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>

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>

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.

The Focus of the Course in 2012 – “Responsible Science”

In 2012 I have been asked to serve on a new committee of the National Research Council focused on “Responsible Science.” Our course will take as its central focus issues of “responsible science.” Below is the statement of task for the NRC committee that provides a bit more background to this concept and outlines the sort of questions we will be exploring this term.

Responsible Science: Ensuring the Integrity of the Research Process

Statement of Task

An ad hoc committee under the oversight of COSEPUP will undertake a revision of the *Responsible Science* study first issued in 1992. The committee will be charged with addressing the following questions:

- What is the state of current knowledge about modern research practices for a range of disciplines, including trends and practices that could affect the integrity of research? What is the impact of modern technology such as image enhancement, the Internet, and data storage systems?
- What are the impacts on integrity of changing trends in the dynamics of the research enterprise, such as globalization, the treatment of intellectual property, handling of materials and specimens, university oversight and IRBs, and demands of government regulation?

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>

- What are the advantages and disadvantages of enhanced educational efforts and explicit guidelines for researchers and research institutions? Can the research community itself define and strengthen basic standards for scientists and their institutions? How is this impacted by increased collaboration among researchers, in the US and internationally?
 - What roles are appropriate for government agencies, research institutions and universities, and journals in promoting responsible research practices? What can be learned from institutional and journal experiences with current procedures for handling allegations of misconduct in science?
 - What should the definition of research misconduct include? Should it only include the criteria of “falsification, fabrication and plagiarism” (drawn from the 1992 edition of *Responsible Science*) or should it be broadened to include elements of questionable research practices and research impropriety?
 - Should existing unwritten practices be expressed as principles to guide the responsible conduct of research? The committee is encouraged to prepare model guidelines and other materials if it deems that would be useful.
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Requirements of the Course

Seminar Format

The course is a seminar, which means that we each share responsibility for participation and leadership. 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, (at least) 3 weeks of student-led classes (to be discussed in class), attendance at several outside-class events and an individual term project.

Readings

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. If you have any difficulties obtaining the readings, please just send me an email.

There are two books that we will read for the class, and one is optional:

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

Optional Book:

Macrina, F. L. 2005. **Scientific Integrity: Text and Cases in Responsible Conduct of Research, Third Edition** (American Society for Microbiology).

Guest Speakers

We currently have several guest speakers lined up. These include:

- Professor Ben Hale, University of Colorado
- Professor Joseph Rosse, University of Colorado
- Professor Lisa Dilling, University of Colorado

As opportunities allow, we may also have other guests able to join our class.

Weekly One Pagers

Every week you are expected to turn in a one-page essay. The essay will be due every **Thursday** to be submitted via the course email list-serv:

envs5100@lists.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.

The first submission is due January 26 and the final one is due April 26. No submission is expected March 29, which is during Spring Break.

Periodic Assignments

There will be periodic assignments throughout the term.

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. You are required to attend 2 additional events outside of class, and provide a report back to the class on the event and its relationship to class themes. Details to be announced in class.

Individual Term Projects

You will be responsible for completing a semester-long project which will be in the form of a literature review related to a topic of “responsible science.” I would like a 1 page description of your final project by **February 20 in class.**

Grading

Your grade will be determined as based on your effort and performance on all of the above.

Assignment Tracking Table

DATE	ASSIGNMENT DUE	
23 January		
30 January	1-pager (1/26)	Ben Hale Visit
6 February	1-pager (2/2)	In-class Budget Assignment
13 February	1-pager (2/9)	
20 February	1-pager (2/16) Final Project Proposal Due in Class	
27 February	1-pager (2/23) Budget Assignment Due in Class	
5 March	1-pager (3/1)	Joseph Rosse Visit
12 March	1-pager (3/8)	
19 March	1-pager (3/15)	Lisa Dilling Visit
26 March	SPRING BREAK	NO CLASS
2 April	1-pager (3/22)	Rough draft of final literature review is due
9 April	1-pager (4/5)	
16 April	1-pager (4/12)	In-class Advisory Group assignment
23 April	1-pager (4/19)	
30 April	1-pager (4/26)	
10 May	Final 7:30-10:00AM	Literature reviews due

Tentative Schedule and Readings

PART I – INTRODUCTION (2 Weeks)

Week 1 – January 23 – Introduction, Overview

Welcome
Introductions
Email list
Syllabus

First Introduction to the Course Themes
What you should be reading on a regular basis
Homework – watch the State of the Union Address, with an eye to STP themes
Start reading

Week 2 – January 30 – Introduction to Responsible Science

Class led by Professor Ben Hale (CSTPR, ENVS, PHIL)

National Research Council. Responsible Science, Volume I: Ensuring the Integrity of the Research Process. Washington, DC: The National Academies Press, 1992.

National Research Council. Responsible Science, Volume II: Ensuring the Integrity of the Research Process. Washington, DC: The National Academies Press, 1992.

Macrina, Chapters 1 and 2

PART II – CONTEXT (4 weeks)

Week 3 – February 6 – Federal Budget Process I

In-Class Budget Assignment (details and materials to be provided by email)

AAAS REPORT XXXVI: RESEARCH AND DEVELOPMENT FY 2012,
Chapters 1-3
Chapter 1 -- Federal R&D in the FY 2012 Budget: An Introduction
Patrick J. Clemins, AAAS
<http://www.aaas.org/spp/rd/rdreport2012/12pch01.pdf>

Chapter 2

Historical Trends in Federal R&D

Patrick J. Clemins, AAAS

<http://www.aaas.org/spp/rd/rdreport2012/12pch02.pdf>

Chapter 3

Political and Policy Context for the FY 2012 Budget

Kasey Shewey White, AAAS

<http://www.aaas.org/spp/rd/rdreport2012/12pch03.pdf>

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/fy2004/>

<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 13 – Federal Budget Process II

To read FY 2013 President’s Budget (TBD, it will be released about a week or so after the SOTU address)

Be sure to have read the AAAS chapters from the previous week, and additional materials will be provided related to the FY2013 budget debate following the SOTU

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/fy2004/>

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

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

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

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

Week 5 – February 20 – Historical Perspectives on Science Policy

NOTE: Your term project proposals are due today!

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.

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.

Pielke, Jr., R. 2010. In Retrospect: Science - The Endless Frontier. *Nature* **466**:922-923

Various Optional:

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

Ehlers, Vern, *Unlocking Our Future: Toward a New National Science Policy*, 1998, at: http://www.house.gov/science/science_policy_report.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 6 – February 27 – Science and Engineering Indicators 2012

National Science Board. 2012. *Science and Engineering Indicators 2012*. Arlington VA: National Science Foundation (NSB 12-01).
<http://www.nsf.gov/statistics/seind12/>

PART III – RESPONSIBLE SCIENCE (8 weeks)

Week 7 – March 5 – Research Misconduct

Professor Joseph Rosse, Leeds School of Business

CU's Research Misconduct Policy

<https://www.cu.edu/policies/aps/academic/1007.pdf>

http://www.colorado.edu/VCREsearch/integrity/researchmisconduct/scrm_rules.pdf

Federal Government Research Misconduct Policy

<http://ori.hhs.gov/federal-research-misconduct-policy>

Week 8 – March 12 -- Student-led case study #1

Week 9 – March 19 – Student-led case study #2

Professor Lisa Dilling, CSTPR, CIRES, ENVS

Week 10 – March 26 – SPRING BREAK

ENJOY!!

Week 11 – April 2 – Student-led case study #3

Week 12 – April 9 – CLASS GOES TO A LECTURE

**Wag the Dog: Ethics, Accuracy and
Impact of the Science of Extremes in Political Debates**

Roger Pielke, Jr.

Center for Science and Technology Policy Research Noontime Seminar

LOCATION TBA

Attendance at this seminar will be informed by attending this prior seminar,
which will set the background:

Friday March 2, 2012. 03:30 pm. IBS Building, room 155

The Science and the Politics of Disasters and Climate Change

Week 13 – April 16– Science Advisory Committees

Pielke, **The Honest Broker**

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>

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>

Bipartisan Policy Center 2009, Improving the use of science in regulatory policy, Report. <http://www.bipartisanpolicy.org/library/report/science-policy-project-final-report>

PART IV: WRAP-UP, FINAL THEMES

Week 14 – April 23 -- Science Advisory Committee Projects Due

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

Sarewitz, D. 2004. How science makes environmental controversies worse, *Environmental Science & Policy* 7 (2004) 385-403.

Pielke, R. A., R. Klein (2009), The Rise and Fall of the Science Advisor to the President of the United States. *Minerva* 47 (1) 7-29

Week 15 -- April 30 -- STP Research, Practice and Careers

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.

Week 16 – May 10 –FINAL

Boulder Campus Spring 2012 Syllabi Statements

(1) The Boulder Provost's Disability Task Force recommended syllabus statement:

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 can be addressed. Disability Services determines accommodations based on documented disabilities. Contact: [303-492-8671](tel:303-492-8671), Center for Community N200, and <http://www.colorado.edu/disabilityservices>.

If you have a temporary medical condition or injury, see guidelines at <http://www.colorado.edu/disabilityservices/go.cgi?select=temporary.html>

Disability Services' letters for students with disabilities indicate legally mandated reasonable accommodations. The syllabus statements and answers to Frequently Asked Questions can be found at <http://www.colorado.edu/disabilityservices>

(2) It is the responsibility of every instructor to clearly explain his or her\ procedures about absences due to religious observances in the course syllabus so that all students are fully informed, in writing, near the beginning of each semester's classes. Campus policy regarding religious observances states that faculty must make reasonable accommodation for them and in so doing, be careful not to inhibit or penalize those students who are exercising their rights to religious observance. Faculty should be aware that a given religious holiday may be observed with very different levels of attentiveness by different members of the same religious group and thus may require careful consideration to the particulars of each individual case. See http://www.colorado.edu/policies/fac_relig.html

If you have questions about providing students with religious accommodations, please contact the Office of Discrimination and Harassment at [303-492-2797](tel:303-492-2797).

A comprehensive calendar of the religious holidays most commonly observed by CU-Boulder students is at <http://www.interfaithcalendar.org/>

Recommended syllabus statement:

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

(3) Faculty and students should be aware of the campus "Classroom Behavior" policy at <http://www.colorado.edu/policies/classbehavior.html> as well as faculty rights and responsibilities listed at http://www.colorado.edu/FacultyStaff/faculty-booklet.html#Part_1

These documents describe examples of unacceptable classroom behavior and provide information on how to handle such circumstances should they arise. Faculty are encouraged to address the issue of classroom behavior in the syllabus.

Recommended syllabus statement:

Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, color, culture, religion, creed, politics, veteran's status, sexual orientation, gender, gender identity and gender expression, age, disability, 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 policies at <http://www.colorado.edu/policies/classbehavior.html> and at http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code

(4) The Office of Discrimination and Harassment recommends the following syllabus statement:

The University of Colorado at Boulder Discrimination and Harassment Policy and Procedures, the University of Colorado Sexual Harassment Policy and Procedures, and the University of Colorado Conflict of Interest in Cases of Amorous Relationships policy apply to all students, staff, and faculty. Any student, staff, or faculty member who believes s/he has been the subject of sexual harassment or discrimination or harassment based upon race, color, national origin, sex, age, disability, creed, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at [303-492-2127](tel:303-492-2127) or the Office of Student Conduct (OSC) at [303-492-5550](tel:303-492-5550). Information about the ODH, the above referenced policies, and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at <http://www.colorado.edu/odh>

(5) The Boulder campus has a student Honor Code and individual faculty members are expected to familiarize themselves with its tenets and follow the approved procedures should violations be perceived. The Honor Council recommended syllabus statement:

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; [303-735-2273](tel:303-735-2273)). 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/>