Science and Technology Policy
Syllabus for ENVS 5100
University of Colorado – Spring 2015
Professor: Lisa Dilling
Thursdays 11-1:30pm

Classroom: CSTPR Conference Room (1333 Grandview Ave.)
Office Hours: Tuesday 9-11 am or by appointment
Office Location: Ekeley S340 (3rd floor CIRES building)
Phone: 303-492-4894
email: ldilling@colorado.edu
Course website is on D2L; login to myCUinfo and the course website should be under your student tab.

Overview and Purpose of the Course

The U.S. has maintained a high level of commitment to publicly-funded science and technology since the end of World War II. From agriculture to defense to space studies to basic disciplinary research, a vast scientific enterprise has emerged as a result. The utilization of science and technology in society has also grown exponentially, with discoveries in drug therapies, computing, genetics, communication technology and many other areas fundamentally changing the way we live our lives. The field of science and technology policy research seeks to understand how we decide what science and technology is prioritized and funded, how we justify such expenditures in society, how we conduct science and technology for societal benefit, and how we govern the use of scientific and technological results in society. Scholars in STP research ask questions such as: "Can research help solve a particular problem? If so, how much is required, how do we organize our efforts, and how do we judge success? What science is "the right science" to do? How does science benefit society, and how might public investments improve quality of life? What policies do we need to supply the human resources involved in science and technology? What is the appropriate role of government versus private industry? What is the appropriate role of scientific advice in society? How is science used in decision making? What is the appropriate way to govern or monitor the scientific or technological community and its output? How can the public interact to ensure democratically-held ideals such as participation and transparency are upheld in the production or use of highly technical information?"

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.

Learning Goals for the Course:

1. Gain familiarity with the U.S. federal landscape for science policy and budget decision making, including the various governmental and non-governmental actors
2. Learn how to identify the goals of science policies and evaluate their effectiveness

3. Gain an understanding of politics, advocacy and the roles of scientists and others in the science policy landscape
4. Recognize the roles and responsibilities involved in the governance of science, including evaluating risks, citizen participation, technology assessment, etc.

Requirements of the Course

Seminar Format

The course is a seminar, which means that we each share responsibility for pedagogy. Class participation is critical and lectures will be kept to a minimum to encourage discussion. The formal requirements of the course include writing short one-pagers most weeks, leading class discussion twice a semester, in-class group assignments, attendance at outside-class events and an individual term project.

Readings and Class Participation

It is essential that you come prepared to discuss the week's readings in order for you to gain benefit from the course. I have listed readings for the course in 2 categories, required and optional. For each class you should read at the minimum the required readings, and if you want to delve into the optional ones that will enhance your perspective. I expect everyone to participate in class discussions each week. All required articles will be made available either by email or from the course D2L website, in PDF or HTML format. I will place copies of required books on reserve at the library if anyone requests it, just let me know.

In addition to articles and online sources, there are 2 books that we will read for the class:

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

2. Parthasarathy, S. (2012). **Building genetic medicine: breast cancer, technology, and the comparative politics of health care**. *MIT Press Books*, *1*.

In addition, three classes of the semester (the three before the very last class) will be devoted to topics chosen by the class—we will choose these early in the semester and the leaders are free to choose readings and I am happy to help in that task as well.

Weekly One Pagers

Every week (with a few exceptions) you are expected to turn in a one-page essay. The essay will be due every **Wednesday by midnight** (typically should be based on the material for the next day's class, although it is flexible as you see below) to be submitted to the discussion board on D2L. One-pagers submitted past midnight on Wednesday will not earn credit for the week. If there is a problem with D2L feel free to email me your one-pager directly.

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.

Leading Discussions

Each of you will be asked to share responsibility for leading discussion for twice a semester. Depending on the number of people in the class you may be in a group of 2 or 3. 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, questions posed for discussion, etc. You are free to assign a deliverable (e.g., short paper) to the class. Be creative with this, have fun, think about how to engage your classmates in the topic!

Outside Events and STP in the News

There is 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 (they do not need to be talks at our Center), and provide a report back to the class on the event and its relationship to class themes. Here are some of the events scheduled for this term at the Policy Center, meeting time is at 12:15 on Monday unless otherwise announced:

January 26 Sugar, Spice And Everything Nice: Science and Policy of "Sex Testing" in Sport by Roger Pielke, Jr., CU Boulder

February 23 Informing the Deliberation and Design of Research Using a Typology of Research Approaches by Elizabeth McNie, Western Water Assessment, CU Boulder

March 2 Title TBA by Marisa McNatt, ENVS Grad Student

March 9 Ignorance Isn't Bliss: Why Historical Emitters Owe Compensation for Climate Change by Paul Bowman, Center for Science and Technology Policy Research and Environmental Studies, CU Boulder

April 6 Fracking In Denton, Texas: Who Benefits and Why Was it Banned? by Jordan Kincaid

April 13 Mobilizing Individual Responsibility Through Personal Carbon Budgeting by Steven Vanderheiden, Center for Science and Technology Policy Research, Political Science, and Environmental Studies, CU Boulder

You can see more at our website: http://sciencepolicy.colorado.edu/
Additional talks will be added as the semester progresses.

Here are some of the websites of other organizations that will likely have STP related events this spring. Please pick a talk that has a science-policy aspect to it, not a pure science talk -- with that caveat the range of talks that fit is still quite broad!:
RASEI (energy): http://rasei.colorado.edu/events
ENVS: http://envs.colorado.edu/about/
Economics: http://www.colorado.edu/Economics/seminars/index.html
Silicon Flatirons Center: http://www.siliconflatirons.com/events.php

STP in the News -- Optional: I would ask that you track the news for items of interest to you in Science and Technology Policy and bring them into class for discussion (can post to our class website as well).

Individual Term Projects (I am open to making these small group projects up to three in a group. Let us discuss in class and decide).

The final project for the class will be a policy evaluation of any science policy you are interested in (broadly construed, could be a policy, a program, a practice; but must be specific). The final paper should clearly identify the goals or aims of the policy, articulate the problem you propose to analyze and its context, identify and represent viewpoints of stakeholders, present evidence, clarify and analyze options to address the problem, formulate conclusions about pros and cons of options, and where appropriate, make recommendations based upon the analysis. We will go over the tools and skills you need for your analysis in class throughout the semester. The topic will be of your choosing, and I am happy to work with you to narrow down your topic as needed. I suggest you pick a narrow enough topic that you can do a sufficiently in-depth analysis in a normal term paper length (think of a journal-length article, around 8000 words or around 15 pages single spaced). The length is not strictly prescribed but should be sufficient to treat your topic and yet still be concise. I would like a 1 page proposed topic outline no later than **February 19** (earlier is fine as well). Throughout the semester we will use some class time to check-in on the progress of this project and small progress deliverables are assigned as below. The final paper will be due **April 30th** during our last class period. We may build in an intermediate date for drafts to be due and to obtain feedback before final version is due.

Final Presentation

Each student will do a final 10 minute presentation based on their project that last day of class on Thursday, April 30th. Final papers will be turned in during class at that time as well. There is no final exam.

Guest Speakers
We will discuss ideas for guest speakers to invite to class.

Grading

Your grade will be determined as based on your efforts on all of the above. These are rough percentages: In class participation/Weekly one pagers/2 outside events reports ~ 35%; Paper and progress deliverables/Final Presentation ~ 65%

Assignment Tracking Table

Week	DATE	ASSIGNMENT DUE
1	15 January	
2	22 January	1-pager
3	29 January	1-pager
4	5 February	1-pager
5	12 February	1 page- Write up of final budget solution
6	19 February	1 page Final Topic proposal (in class)
7	26 February	1-pager AND Bring short description of "your" policy's goals and the problem you propose to analyze
8	5 March	1-pager AND Bring short list of where you will find evidence for your policy analysis
9	12 March	1-pager AND Brainstorm list of the stakeholders interested in your policy issue and their positions
10	19 March	1-pager
11	26 March	**NO CLASS - Spring Break**
12	2 April	1-pager
13	9 April	1-pager
14	16 April	1-pager
15	23 April	1-pager
16	30 April	**Final Paper Due and Final Project Presentations**

Assignments throughout the term:
- attending 2 outside events and reporting back to the class
- discussion leadership twice in the semester

- in class activities

Tentative Schedule and Readings (Subject to Change!)

Week 1 – January 15 – Introduction, Overview

Introductions
Syllabus
SPGrads, the STP certificate option
Schedule
Discuss options for book 3; discussion leaders schedule; future topic selection; other guest speakers of interest?

First Introduction to the Course Themes – What is Science and Technology Policy?
What you should be reading on a regular basis

Week 2 – January 22 – The "Social Contract" and U.S. Science Policy in Historical Perspective

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.

Garfield, E. (1988) Science/Technology Policy. Part 1. Will the Real Science Policy Please Stand Up? *Forays into the History and Realm of Science Decision Making,* Number 47, November 21

Guston, D. H. and Keniston, K. 1994. Introduction: The social contract for science. In: *The Fragile Contract: University Science and the Federal Government*. Guston, D.H. and Keniston, K., Eds. MIT Press, Cambridge, MA, pp. 1-41

Funtowicz, Silvio and Jerry Ravetz (2008). "Post-Normal Science." In: *Encyclopedia of Earth*. Eds. Cutler J. Cleveland (Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment).
http://www.eoearth.org/article/Post-Normal_Science

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

Brown, G.E. Minority Leader, US House Science Committee (Response to Ehlers)
http://www.aps.org/publications/apsnews/199901/future.cfm

Bush, Vannevar. *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).

Sarewitz, D., G. Foladori, N. Invernizzi, and M. Garfinkel 2004. Science Policy in its Social Context, *Philosophy Today*, v. 48(5): 67-83.

Week 3 – January 29 – Federal Budget Overview and Process I

Budget assignment handed out

Required:
SOSP edited volume: Chapter 14 (Koizumi)

Introduction to the Federal Budget (from AAAS)

From this report—just read Chapters 1-4 AND pick one additional chapter of your favorite agency or disciplinary analysis chapter to read.
AAAS REPORT XXXVIII RESEARCH AND DEVELOPMENT FY 2014
http://www.aaas.org/report/aaas-report-xxxviii-research-and-development-fy-2014

This is a helpful website in general:
http://www.aaas.org/program/rd-budget-and-policy-program

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

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/

AAAS. 2008. Guide to R&D Funding Data: Online tutorial on the federal budget. Website: http://www.aaas.org/sites/default/files/migrate/uploads/aaasrd20101118.pdf

AAAS. 2008. Guide to R&D funding data-historical data. See AAAS archive.

Week 4 – February 5 – Federal Budget Overview and Process II

In class work on budget exercise handed out Week 3.

Week 5 – February 12 – Science policy in the U.S. -- "Is it broken and how do we know?"

Required:
SOSP Chapter 2 (Marburger)

Bozeman, B. and Sarewitz, D. 2005. Public values and public failure in U.S. Science Policy. *Science and Public Policy*, 32(2) 119-136

Bardach, E. *A Practical Guide for Policy Analysis: The 8-fold path to more effective problem solving* pp. xiii-46 (2000). - skim through

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

Marburger, J. 2005. Wanted: Better Benchmarks. *Science* 308:1027.

Weiss, J. 1989. The powers of problem definition: The case of government paperwork. Policy Sciences 22:97-121.

Optional but look through for context on GPRA:
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.

Week 6 – February 19 – Science Policy Actors and Institutions

Required [most of these are fairly short and easy reading.]

SOSP Chapter 13 (Thomas and Mohrman), Chapter Chapter 15 (Bonvillian), chapter 16 (Goldston)

Sherwood L. Boehlert, 2007. The Role of Scientists in Policymaking. *AAAS-CSPO S&T Policy Review: Highlights of the 2007 Forum on S&T Policy*.

Marincola, E. 2003. Research Advocacy: Why every scientist should participate. *Public Library of Science Biology*. 1(3) 331-333.

Monastersky, R. 2010. In the eye of the Storm. Nature 468:1024-1028

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.

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

Holdren, J. 2009. Science in the White House. Science 324:1 May

D. Sarewitz, 2009. The rightful place of science, *Issues in Science and Technology*, summer. http://www.issues.org/25.4/sarewitz.html

Week 7 - February 26 – More on Evaluation and Policy Analysis

Required:
Morgan, and Henrion. *Uncertainty : A Guide to Dealing with Uncertainty in Quantitative Risk and Policy Analysis* Chapters 3. pp. 16-46 (1990).

Nilssom, M. et al. 2008. The use and non-use of policy appraisal tools in public policy making: an analysis of three European countries and the European Union. *Policy Sciences* 41:335–355.

McCain, L. 2002. Informing technology policy decisions: the US Human Genome Project's ethical, legal, and social implications programs as a critical case. Technology in Society 24: 111–132

Varvasovszky, Z. and R. Brugha (2000) How to do a stakeholder analysis . *Health Policy and Planning* 15: 338-345.

Week 8 – March 5 – Science and informing decision making

Required:
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.

Dilling, L. and M.C. Lemos. 2011. Defining Usable Science: What can we learn for science policy from the seasonal climate forecasting experience? Global Environmental Change. doi:10.1016/j.gloenvcha.2010.11.006

Kammen, D.M. and Dove, M.R. 1997. The virtues of mundane science. *Environment* 39(6):10-41

Sarewitz, D. 2004. How science makes environmental controversies worse. *Environmental Science and Policy*. 7:385-403.

Weinberg, A.M. 1970. The axiology of science. *American Scientist* 58:612-617

Public Private issues:

Morss, R. and Hooke, W. 2005. The outlook for U.S. meteorological research in a commercializing world. *Bulletin of the American Meteorological Society* 86(7)921-936.

Stern, A. 2013. The low cost ticket to space. Scientific American, April 2013.

Week 9 – March 12 – Book 1: The Honest Broker by Roger Pielke, Jr. GUEST Confirmed.

Week 10 – March 19 – Governance of Science and Technology in Society
Required:
Backstrand, K. 2003. Civic science for sustainability: Reframing the role of experts, policy-makers and citizens in environmental governance. Global Environmental Politics 3(4):24-41

Jasanoff, S. 2003. Technologies of humility: Citizen participation in governing science. Minerva 41:223-244

D. Sarewitz, 2005. Where responsibility lies, CSPO Perspective, December 2005. http://www.cspo.org/ourlibrary/perspectives/Sarewitz_December05.htm

White, Jr. L. 1974. Technology assessment from the stance of a medieval historian. *The American Historical Review*, Vol. 79, No. 1:1-13.

Stirling, A. Risk, precaution and science: towards a more constructive policy debate. *EMBO Reports* 8(4):309- 315. (2007)

Week 11 – March 26 – SPRING BREAK

ENJOY!!

Week 12 – April 2 – Book 2: Parthasarathy, S. (2012). Building genetic medicine: breast cancer, technology, and the comparative politics of health care.

Week 13 – April 9 – OPEN for student determined topics

Week 14 – April 16 – OPEN for student determined topics

Week 15 – April 23– OPEN for student determined topics

Week 16 - April 30 - Final Papers and Presentations
Plan for a 10 minute powerpoint presentation in class summarizing your paper analysis and findings.

Policies and Procedures:

1. Accommodations for disability and injury

If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner-- the earlier in the semester the better (for exam accommodations provide your letter at least one week prior to the exam) so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities. Contact Disability Services at 303-492-8671 or by e-mail at dsinfo@colorado.edu.

If you have a temporary medical condition or injury, see Temporary Injuries under Quick Links at Disability Services website (http://disabilityservices.colorado.edu/) and discuss your needs with me in person.

2. Policy regarding religious observances

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. In this class, students with religious obligations that conflict with the exam dates or other required activities in class should contact me early in the semester so that accommodations can be made.

See full details at http://www.colorado.edu/policies/fac_relig.html

3. Classroom Behavior Standards

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. Discrimination and Harassment

The University of Colorado Boulder (CU-Boulder) is committed to maintaining a positive learning, working, and living environment. The University of Colorado does not discriminate on the basis of race, color, national origin, sex, age, disability, creed, religion, sexual orientation, or veteran status in admission and access to, and treatment and employment in, its educational programs and activities. (Regent Law, Article 10, amended 11/8/2001). CU-Boulder will not tolerate acts of discrimination or harassment based upon Protected Classes or related retaliation against or by any employee or student. For purposes of this CU-Boulder policy, "Protected Classes" refers to race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, or veteran status. Individuals who believe they have been discriminated against should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Student Conduct (OSC) at 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://hr.colorado.edu/dh/4

5. Honor Code

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). 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://honorcode.colorado.edu