

UNIVERSITY OF MINNESOTA  
HUMPHREY SCHOOL OF PUBLIC AFFAIRS

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**Course Syllabus for PA 5711  
Science, Technology & Environmental Policy  
Fall 2015**

Class Time: Friday, 9:05am – 12:00pm in HHH 60

**Professor Gabe Chan**

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Office Hours: HHH 161, by appointment

**Course Description**

This course will investigate, from a variety of perspectives, the ways in which human society is transforming (and being transformed by) science, technology, and the environment. Drawing on ideas from a wide spectrum of the social sciences, this course will prepare students to grapple with contemporary policy issues in arenas such as systems for intellectual property, global climate change, public health, technology for development, the science and engineering workforce, innovation, and regulation of emerging technologies. Special emphasis will be given to policies at the intersection of science, technology, and the environment. No student (or the instructor) will have a sophisticated understanding of the full range of disciplinary perspectives and topical issues we will explore; all are expected to bring some relevant experience, expertise, or perspective to the table, and to integrate it with that of their classmates through discussion and teamwork. The focus of the course is public policy in the United States, but several class sessions will cover issues related to globalization and international development.

By the end of the course, my hope is that you will achieve the following learning goals:

- A substantive understanding of the policy spheres and major institutions that shape science, technology, and environmental policy;
- A familiarity with the major schools of thought and key literatures that shape science, technology, and environmental policy;
- The ability to apply core concepts from readings and lectures to contemporary policy issues, even in cases where the scientific or technical dimensions may be unfamiliar to you;
- Practice writing memos that defend original policy positions;
- A sense of confidence in exploring multiple sides to policy issues (including through original research) that involve critical technical, social, political, and institutional dimensions;
- A greater openness to receiving constructive feedback from your peers and improved skills in providing feedback yourself;
- A deepened curiosity in one or more areas of science, technology, and environmental policy that inspires future coursework, research, professional development, and learning.

**Class Structure**

This course will meet for a three-hour block once per week on Fridays from 9:05 – 12:00. Each class will begin with discussion of the week's readings led by one or more students assigned to be reading discussants and respondents. I will then lead a lecture-based discussion. The second half of each class will alternate each week between a debate and case study of contemporary policy issues related to the week's

topic. Students will then engage each other in discussion on this policy issue, during which we will draw out more general ideas.

The structure of the semester is detailed in the schedule at the end of the syllabus. Broadly, we will spend the first four weeks focused on science and technology policy (with many examples drawn from the environmental sphere). The next four weeks will focus on environmental policy (with many examples and connections drawn to science and technology issues). The final four weeks examine cross-cutting issues across science, technology, and environmental policy, which will include student presentations on a cross-cutting topic of choice.

## **Expectations**

### 1. How to prepare for class

Readings are an essential part of this class. You should expect around 70-100 pages of reading (or equivalent) per week drawn from scholarly publications, popular articles, and other forms of media (e.g. videos). Each week, students will be given a list of required and optional readings. This syllabus contains a preliminary set of readings, but this will be updated as we go. The final set of readings will be posted to the course webpage soon after the class prior to when they will be discussed, giving you one week to complete the reading. Required readings represent the minimum level of reading needed to participate and fully engage in class discussions. Optional readings are not required but will give additional depth to the topics of the week.

Reading Discussants: On the first day of class, students will sign up to be “reading discussants” for a particular week. Reading discussants are required to lead discussion for approximately 30 minutes on the week’s readings at the beginning of each class. 24 hours prior to the class for which a student is assigned, discussants will post a list of insightful questions to stimulate discussion on the course webpage for all other students to ponder.

Reading Respondents: At the beginning of each class, one student will be *randomly* selected to be the week’s reading respondent (everyone will get a turn). Reading respondents are responsible to listen carefully to the reading discussant and provide specific additions, critiques, or insights that build on the discussion started by the discussant.

More specific expectations for discussants and respondents will be reviewed on the first class.

### 2. Participation and Absences

This is a discussion-based class. We will be covering many complex topics where technical problems meet political, economic, and ethical issues – many times there will be no “right answer.” This means that sharing your diversity of perspectives will be required to make this a worthwhile class for you and your classmates. A good participation grade will require active engagement that advances beyond a surface-level understanding of the readings. If you have to miss class for any reason, best practice is to email me ahead of time and make me aware of your circumstances. To make up for missed class, students will be assigned to write a one-page reflection of that week’s readings to be submitted no later than the Monday after the missed class.

### 3. Plagiarism

University of Minnesota and Humphrey school policies regarding plagiarism and documenting sources apply to this class. Plagiarism will be taken very seriously – document all of your sources and avoid

ambiguity. There is a very small but very important distinction between plagiarism and the appearance of plagiarism, so it is better to be clear through referencing your sources. I also realize that standards for citing sources vary tremendously in the policy world. However, in all assignments for this class, you will be expected to provide citations to every source you consult and build upon. Please also note that all assignments are automatically checked for plagiarism by turnitin<sup>®</sup> on Moodle.

#### 4. Mental Health and Disability Accommodations

This class is being offered in a professional school and is designed for graduate-level students with experience in the real world. I will assume that you will come into the semester with prior experience managing a complex set of assignments and deadlines. While this course will have a lot of work, my hope is that all of it will be useful. That being said, graduate school should be an opportunity for you to shape your intellectual and professional self in the way that you want it to be. If the work for this course becomes tedious, overwhelming, or you have other things going on in your life that you feel are more important, please keep communication with me open. It is better that I know and understand your conditions than you come to class surprisingly unprepared. And above all, your mental health is of utmost importance – no amount of stress is worth sacrifices to your personal wellbeing.

In addition, if you have a documented disability or any other circumstance that you think may affect your ability to meet course expectations, please come see me early in the semester so that arrangements can be made regarding classroom organization, deadlines, or any other features of the class. You can learn more about the broad range of confidential mental health services available on campus via [www.mentalhealth.umn.edu](http://www.mentalhealth.umn.edu). If you have, or think you may have, a disability, please contact Disability Services at (612) 626-1333.

#### Evaluation and Assignments

Grading for this course will have four major components. First is participation, which will be evaluated based on your participation in classroom discussions (including debates and cases) as well as your performance as the week's assigned reading discussant or respondent. Second is a policy memo on R&D policy due on October 12. Third is a policy memo on environmental regulation due on November 2. Finally, you will complete an individual final project. Evaluation of the final project will be based on a written paper, oral presentation to the class, and your thoughtfulness as a discussant of one of your peer's project.

The breakdown of final grades will be as follows:

- |                              |       |
|------------------------------|-------|
| 1. Policy Memo 1 (R&D)       | 10%   |
| 2. Policy Memo 2 (Env. Reg.) | 15%   |
| 3. Final Project             | (50%) |
| a. Paper                     | 30%   |
| b. Presentation              | 15%   |
| c. Discussant                | 5%    |
| 4. Participation             | (25%) |
| a. Class Discussion          | 20%   |
| b. Reading Discussant        | 5%    |

Brief descriptions of the assignments are detailed below. More specific guidelines will be distributed in class well before the deadlines.

Policy memo 1: Choose a technology area and present a coherent argument for why R&D funding in the selected area should be increased (or decreased). Describe the potential for new technologies in this area to create public value and provide any appropriate caveats for risks (including technological, social, and economic). Your audience is a U.S. or other national R&D funding agency, examples in the U.S. of such agencies include: DOE, NSF, NIH, NASA, etc. **Due by noon on October 12.**

Policy memo 2: Choose an environmental management issue with a technical dimension. Describe the environmental problem (causes, impacts, harms, risks) and then propose a *regulatory* approach to mitigating this environmental problem. Analyze stakeholders (how would you build support), if relevant, discuss the legal or economic basis for regulation. The audience for this memo is any national or subnational environment agency or decision maker with regulatory authority, examples in the U.S. of such agencies include the U.S. EPA and the Minnesota Pollution Control Agency. **Due by noon on November 2.**

Final project: Choose a policy topic that has both an element of science/technology policy and an element of environmental policy. Write an issue brief that describes the issue and presents *all sides* of the issue in a balanced manner. Then, go the extra step of picking a side and defending your stance on a legal, economic, normative or other basis (but be explicit). The audience for the project is a national or subnational decision maker of your choice with little prior knowledge of the topic – you will be required to define who you are speaking to. You will be required to submit an outline (not for grading but a good chance for feedback), a first draft (to be distributed to your assigned discussant), and a final draft. You will then give a 5-7 minute presentation in the penultimate or final class, each followed by brief responses from assigned discussants. **Outline due in class on October 23; First Draft due on November 23; Presentations in class on December 4 or 11 (if needed); Final draft (electronic copy) due by noon on December 14.**

Project Discussant: you will receive a randomly assigned classmate's draft final paper on November 23. During the final class, you will be in class for your peer's presentation of the paper and will be responsible for providing a 3-minute response. Be collegial but critical in your response. Highlight the strengths and weaknesses. What did your classmate miss? What was convincing? **Responses will be given orally immediately following corresponding presentations in class on December 4 or 11 (if needed); no written component.**

#### Summary of Deadlines:

Assignment	Deadline
Policy Memo 1 (R&D)	October 12
Final project outline	October 23
Policy Memo 2 (environmental regulation)	November 2
Final project first draft	November 23
Final project presentation and discussion	December 4/11
Final project final draft	December 14

## Schedule

### I. Science and Technology Policy

#### September 11, 2015

##### Class 1: Introduction to Science and Technology Policy

Topics: history of post-WWII S&T policy; the legacy of Vannevar Bush's "Endless Frontier;" definitions of science and technology; Pasteur's quadrant; the scope of S&T policy; market failure justification of S&T

##### Required Readings:

1. Pielke Jr, Roger. 2010. "In Retrospect: Science - The Endless Frontier" Science. **2 pages**
2. President Obama at the National Academies of Sciences. 2009. **38 min or 15 pages**
- 3a. U.S. National Academies. 2007. "Rising Above the Gathering Storm" pp. 1 - 17. **17 pages**
- 3b. U.S. National Academies. 2010. "Rising Above the Gathering Storm, Revisited" pp. 1 - 11. **11 pages**

##### Optional Readings:

- Bush, Vannevar, Science: The Endless Frontier, 1945
- Consortium for Science, Policy & Outcomes, Science the Endless Frontier: Learning from the Past, Designing for the Future, 2000
- National Science Board, Science and Engineering Indicators 2014, 2014 (skim chapters and data)
- Sarewitz, Daniel, 'Does Science Policy Matter?', Issues in Science and Technology, 23, 2007.
- Stokes, Donald E., Pasteur's Quadrant: Basic Science and Technological Innovation (Washington, D.C: Brookings Institution Press, 1997)

#### September 18, 2015

##### Class 2: Innovation

Topics: R&D decision making, management and policies; innovation market failures; introduction to the patent system: rationale, basic functioning, contemporary issues; national innovation systems

##### Required Readings:

1. AAAS, 'The Federal Budget Process 101', 2014 <<http://www.aaas.org/news/federal-budget-process-101>>
2. Bernanke, Ben, 'Promoting Research and Development The Government's Role', Issues in Science and Technology, 2011, 4

3. Farrell, Diana, and Thomas Kalil, 'Innovation Policy around the World: United States: A Strategy for Innovation', *Issues in Science and Technology*, 26 (2010) <<http://issues.org/26-3/farrell-2/>>
4. Gallini, Nancy T, 'The Economics of Patents: Lessons from Recent U.S. Patent Reform', *Journal of Economic Perspectives*, 16 (2002), 131–54 <<http://dx.doi.org/10.1257/0895330027292>>
5. Hourihan, Matt, *Federal R&D in the FY 2015 Budget: An Introduction* (AAAS, 2014) <<http://www.aaas.org/sites/default/files/15pch01.pdf>>
6. Kahin, Brian, and Christopher Hill, 'Innovation Policy around the World: United States: The Need for Continuity', *Issues in Science and Technology*, 26 (2010) <<http://issues.org/26-3/kahin/>>
7. Lee, Timothy, 'Everything You Need to Know about Patents - Vox' <<http://www.vox.com/cards/patent-reform>>
8. Mervis, J., 'Play It Again, Uncle Sam', *Science*, 345 (2014), 1442–1442 <<http://dx.doi.org/10.1126/science.345.6203.1442>>
9. Neal, Homer A., Tobin L. Smith, and Jennifer B. McCormick, *Beyond Sputnik: U.S. Science Policy in the Twenty-First Century* (Ann Arbor: University of Michigan Press, 2008)
10. Nicholas, Tom, 'Are Patents Creative or Destructive?', Harvard Business School Working Paper, 14-036 (2013) <[http://www.hbs.edu/faculty/Publication%20Files/14-036\\_88022f59-a293-4a6f-b643-b205304bce91.pdf](http://www.hbs.edu/faculty/Publication%20Files/14-036_88022f59-a293-4a6f-b643-b205304bce91.pdf)>

Debate Topic: Gene Patenting

Optional Readings:

11. Gleick, James, 'Patently Absurd', *New York Times*, 12 March 2000 <<http://www.nytimes.com/2000/03/12/magazine/patently-absurd.html?pagewanted=all>>
12. 'The Libertarian Case Against Intellectual Property Rights' <<http://freenation.org/a/f3111.html>> [accessed 8 August 2015]
13. Nelson, Richard R., ed., *National Innovation Systems: A Comparative Analysis* (New York: Oxford University Press, 1993)

**September 25, 2015**

**Class 3: Science**

Topics: economics of science; the globalization of S&T activity; STEM talent; the age of "Big Science;" S&T for national defense and space; innovation spillovers; applying "Big Science" to energy and the environment; universities and publicly funded science

Required Readings:

1. Fuchs, E. R. H., 'Global Manufacturing and the Future of Technology', *Science*, 345 (2014), 519–20 <<http://dx.doi.org/10.1126/science.1250193>>
2. Guston, David H., and Kenneth Keniston, eds., *The Fragile Contract: University Science and the Federal Government* (Cambridge, Mass: MIT Press, 1994)

3. Kennel, C., and A. Dressler, 'Coping with Uncertainty in Space Science Planning', *Science*, 343 (2014), 140–41 <<http://dx.doi.org/10.1126/science.1244231>>
4. Logsdon, John, 'John F. Kennedy's Space Legacy and Its Lessons for Today', *Issues in Science and Technology*, 27 (2011) <[http://issues.org/27-3/p\\_logsdon-3/](http://issues.org/27-3/p_logsdon-3/)>
5. Nelson, Richard R., 'The Simple Economics of Basic Scientific Research', *Journal of Political Economy*, 67 (1959), 297–306
6. Vest, Charles M., *The American Research University from World War II to World Wide Web: Governments, the Private Sector, and the Emerging Meta-University, The Clark Kerr Lectures on the Role of Higher Education in Society*, 1 (Berkeley: Center for Studies in Higher Education, University of California Press, 2007)

Case Topic: Bay-Dole Act

Optional Readings:

7. 'Science and the University: An Evolutionary Tale - Bayh-Dole and the Enclosing Frontier - UCTV - University of California Television' <<http://www.uctv.tv/shows/Science-and-the-University-An-Evolutionary-Tale-Bayh-Dole-and-the-Enclosing-Frontier-13557>>

**October 2, 2015**

#### **Class 4: Innovation for Development**

Topics: technology in the Sustainable Development Goals; technology transfer and leapfrogging; local knowledge; universities in developing countries; country case studies

Required Readings:

1. Cash, D. W., W. C. Clark, F. Alcock, N. M. Dickson, N. Eckley, D. H. Guston, and others, 'Knowledge Systems for Sustainable Development', *Proceedings of the National Academy of Sciences*, 100 (2003), 8086–91 <<http://dx.doi.org/10.1073/pnas.1231332100>>
2. Juma, Calestous, 'Africa Rebooting - New African Magazine', *NewAfrica*, 14 April 2015 <<http://newafricanmagazine.com/africa-rebooting/>>
3. Knols, Bart, and Matthew Cockerill, 'Open Access to Research for the Developing World', *Issues in Science and Technology*, 24 (2008) <<http://issues.org/24-2/cockerill/>>
4. Lee, Keun, Calestous Juma, and John Mathews, 'Innovation Capabilities for Sustainable Development in Africa', *WIDER Working Paper*, 2014/062 <[http://www.wider.unu.edu/publications/working-papers/2014/en\\_GB/wp2014-062/\\_files/91448977713006143/default/wp2014-062.pdf](http://www.wider.unu.edu/publications/working-papers/2014/en_GB/wp2014-062/_files/91448977713006143/default/wp2014-062.pdf)>

Debate Topic: Deploying Technology for Development with RCTs

Optional Readings:

## **II. Environmental Policy**

**October 9, 2015**

### **Class 5: Introduction to Environmental Policy**

Topics: history of environmental policy; environmental externalities, Coasian solutions, and collective action; cost-benefit analysis; uncertainty and risk management; the precautionary principle; environmental regulation

#### Required Readings:

1. Ambec, Stefan, Mark Cohen, Stewart Elgie, and Paul Lanoie, 'The Porter Hypothesis at 20: Can Environmental Regulation Enhance Innovation and Competitiveness?' (RFF, January 2011) <<http://www.rff.org/documents/RFF-DP-11-01.pdf>>
2. Arrow, K. J., M. L. Cropper, G. C. Eads, R. W. Hahn, L. B. Lave, R. G. Noll, and others, 'Is There a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation?', *Science*, 272 (1996), 221–22 <<http://dx.doi.org/10.1126/science.272.5259.221>>
3. Binder, Seth, and Stephen Polasky, 'Valuing the Environment for Decisionmaking', *Issues in Science and Technology*, 28 (2012) <<http://issues.org/28-4/polasky/>>
4. Heinzerling, Lisa, and Frank Ackerman, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection* (Georgetown Environmental Law and Policy Institute, Georgetown University Law Center) <<http://www.ase.tufts.edu/gdae/publications/C-B%20pamphlet%20final.pdf>>
5. Oye, Kenneth, and James Maxwell, 'Self-Interest and Environmental Management', in *Local Commons and Global Interdependence: Heterogeneity and Cooperation in Two Domains*, ed. by Robert Keohane and Elinor Ostrom, 1995 <<http://knowledge.sagepub.com/view/local-commons-and-global-interdependence/n8.xml>>
6. Sunstein, Cass R., *Risk and Reason: Safety, Law, and the Environment* (Cambridge [England] : New York: Cambridge University Press, 2002)

Case Topic: Particulate matter

#### Optional Readings:

7. Morgan, M. Granger, 'Risk Analysis and Management', *Scientific American*, July 1993 <<http://www.scientificamerican.com/article/risk-analysis-and-management/>>

**October 16, 2015**

### **Class 6: Spheres of Environmental Policy**

Topics: air pollution, water pollution, and hazardous materials; the global burden of disease

#### Required Readings:

1. Ashford, Nicholas A., and Claudia S. Miller, 'Peer Reviewed: Low-Level Chemical Exposures: A Challenge for Science and Policy', *Environmental Science & Technology*, 32 (1998), 508A – 509A <<http://dx.doi.org/10.1021/es983778h>>
2. Benedick, Richard Elliot, *Ozone Diplomacy: New Directions in Safeguarding the Planet*, Enl. ed (Cambridge, Mass: Harvard University Press, 1998)

3. Dominici, F., M. Greenstone, and C. R. Sunstein, 'Particulate Matter Matters', *Science*, 344 (2014), 257–59 <<http://dx.doi.org/10.1126/science.1247348>>
4. Sapolsky, Harvey M., 'The Politics of Risk', *Daedalus*, 119 (1990), 83–96
5. The Hamilton Project, 'In Times of Drought: Nine Economic Facts about Water in the United States', The Hamilton Project <[http://www.hamiltonproject.org/papers/in\\_times\\_of\\_drought\\_nine\\_economic\\_facts\\_about\\_water\\_in\\_the\\_us/](http://www.hamiltonproject.org/papers/in_times_of_drought_nine_economic_facts_about_water_in_the_us/)>

Debate Topic: Cost-benefit analysis and precaution on chemical exposure (tent.)

Optional Readings:

**October 23, 2015**

**Class 7: Sustainability and Natural Resources**

Topics: sustainable development; conceptualizing sustainability; dimensions of sustainable development and the promise of technology; natural resource management; ecosystem services

Required Readings:

1. Cohen, Joel E., *How Many People Can the Earth Support?* (New York: Norton, 1996)
2. DeFries, Ruth S., *The Big Ratchet: How Humanity Thrives in the Face of Natural Crisis: A Biography of an Ingenious Species* (New York, NY: Basic Books, 2015)
3. Geels, Frank W., 'Technological Transitions as Evolutionary Reconfiguration Processes: A Multi-Level Perspective and a Case-Study', *Research Policy*, 31 (2002), 1257–74 <[http://dx.doi.org/10.1016/S0048-7333\(02\)00062-8](http://dx.doi.org/10.1016/S0048-7333(02)00062-8)>
4. Holdren, J. P., 'PRESIDENTIAL ADDRESS: Science and Technology for Sustainable Well-Being', *Science*, 319 (2008), 424–34 <<http://dx.doi.org/10.1126/science.1153386>>
5. Solow, Robert, 'Sustainability: An Economist's Perspective', in *Economics of the Environment*, ed. by Robert Stavins, 6th edn, 2012 <[http://isites.harvard.edu/fs/docs/icb.topic203569.files/Solow.Sustainability\\_An\\_Economists\\_Perspective.\\_1993.pdf](http://isites.harvard.edu/fs/docs/icb.topic203569.files/Solow.Sustainability_An_Economists_Perspective._1993.pdf)>
6. Stokstad, E., 'Sustainable Goals from U.N. under Fire', *Science*, 347 (2015), 702–3 <<http://dx.doi.org/10.1126/science.347.6223.702>>

Debate Topic: Tar Sands and Keystone XL

Optional Readings:

**October 30, 2015**

**Class 8: Climate Change**

Topics: climate change as a global commons problem; the mitigation challenge; approaches to mitigation using markets; international climate policy; uncertainty and risk management in climate change; the role of technology policy in mitigation

Required Readings:

1. Aldy, Joseph E, Alan J Krupnick, Richard G Newell, Ian W. H Parry, and William A Pizer, 'Designing Climate Mitigation Policy', *Journal of Economic Literature*, 48 (2010), 903–34 <<http://dx.doi.org/10.1257/jel.48.4.903>>
2. Barrett, Scott, 'The Coming Global Climate–Technology Revolution', *Journal of Economic Perspectives*, 23 (2009), 53–75 <<http://dx.doi.org/10.1257/jep.23.2.53>>
3. EPIC, 'The Clean Power Plan: A Primer', 2015 <[https://epic.uchicago.edu/sites/default/files/The\\_Clean\\_Power\\_Plan\\_A\\_Primer\\_\(3\).pdf](https://epic.uchicago.edu/sites/default/files/The_Clean_Power_Plan_A_Primer_(3).pdf)>
4. IPCC, 'IPCC WGIII: Technical Summary', 2014 <[https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc\\_wg3\\_ar5\\_technical-summary.pdf](https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_technical-summary.pdf)>
5. Keith, David, A Critical Look at Geoengineering against Climate Change <[http://www.ted.com/talks/david\\_keith\\_s\\_surprising\\_ideas\\_on\\_climate\\_change](http://www.ted.com/talks/david_keith_s_surprising_ideas_on_climate_change)>
6. Lehmann, Evan, and Christa Marshall, 'The Long, Hazy and Winding Political Path That Brought the Obama Admin to the Clean Power Plan', *ClimateWire*, 3 August 2015
7. Nordhaus, William D., *The Climate Casino: Risk, Uncertainty, and Economics for a Warming World* (New Haven: Yale University Press, 2013)
8. Pacala, S., 'Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies', *Science*, 305 (2004), 968–72 <<http://dx.doi.org/10.1126/science.1100103>>
9. Wagner, Gernot, *But Will the Planet Notice?: How Smart Economics Can Save the World* (New York; Godalming: Hill and Wang ; Melia [distributor], 2012)

Case Topic: International Climate Policy – The Kyoto and Post-Kyoto approaches

Optional Readings:

**III. Science and Technology Policy Meets Environmental Policy**

**November 6, 2015**

**Class 9: Expertise, Public Engagement, and Society**

Topics: evaluating knowledge and experts; public engagement in science policy; science, technology, and society

Required Readings:

1. Bozeman, Barry, and Daniel Sarewitz, 'Public Value Mapping and Science Policy Evaluation', *Minerva*, 49 (2011), 1–23 <<http://dx.doi.org/10.1007/s11024-011-9161-7>>
2. Clark, William C., and Giandomenico Majone, 'The Critical Appraisal of Scientific Inquiries with Policy Implications', *Science, Technology, & Human Values*, 10 (1985), 6–19
3. Fischhoff, Baruch, 'Communicating Uncertainty: Fulfilling the Duty to Inform', *Issues in Science and Technology*, 28 (2012) <<http://issues.org/28-4/fischhoff/>>

4. Jasanoff, Sheila, 'STS and Public Policy: Getting Beyond Deconstruction', *Science, Technology & Society*, 4 (1999), 59–72
5. Jasanoff, S. S., 'Contested Boundaries in Policy-Relevant Science', *Social Studies of Science*, 17 (1987), 195–230 <<http://dx.doi.org/10.1177/030631287017002001>>
6. Kitcher, Philip, *Science, Truth, and Democracy*, Oxford Studies in Philosophy of Science (New York: Oxford Univ. Press, 2003)
7. Oye, K. A., K. Esvelt, E. Appleton, F. Catteruccia, G. Church, T. Kuiken, and others, 'Regulating Gene Drives', *Science*, 345 (2014), 626–28 <<http://dx.doi.org/10.1126/science.1254287>>
8. Rosenberg, A. A., L. M. Branscomb, V. Eady, P. C. Frumhoff, G. T. Goldman, M. Halpern, and others, 'Congress's Attacks on Science-Based Rules', *Science*, 348 (2015), 964–66 <<http://dx.doi.org/10.1126/science.aab2939>>

Case Topic: Cape Wind (tent.)

Optional Readings:

9. UK House of Commons Science and Technology Committee, *The Reviews into the University of East Anglia's Climatic Research Unit's E-Mails*, January 2011 <<http://www.publications.parliament.uk/pa/cm201011/cmselect/cmsctech/444/444.pdf>>

**November 13, 2015**

**Class 10: Entrepreneurship and Public Policy**

Topics: private sector R&D, industrial R&D labs; entrepreneurship, Silicon Valley, and Clean Tech; the government as an entrepreneur, DARPA, and ARPA-E; public policy for entrepreneurship

Required Readings:

1. Gates, B., n.d. *We Need Clean-Energy Innovation, and Lots of It*.
2. Gertner, J., 2012. *The idea factory: Bell Labs and the great age of American innovation*. Penguin Press, New York, NY.
3. Lerner, J., 2009. *Boulevard of broken dreams why public efforts to boost entrepreneurship and venture capital have failed, and what to do about it*. Princeton University Press, Princeton.
4. Mazzucato, M., 2014. *The entrepreneurial state: debunking public vs. private sector myths*, Revised edition. ed, Anthem frontiers of global political economy. Anthem Press, London ; New York.

Debate Topic: Solyndra and the Loan Guarantee Program (tent.)

Optional Readings:

**November 20, 2015**

**Class 11: New Direction in STEP**

Topics: decision making under uncertainty; technocratic decision making in the light of culture, institutions, norms, equity considerations, and power; new ideas in STEP; connections across STEP

Required Readings:

1. Bonney, R., J. L. Shirk, T. B. Phillips, A. Wiggins, H. L. Ballard, A. J. Miller-Rushing, and others, 'Next Steps for Citizen Science', *Science*, 343 (2014), 1436–37  
<<http://dx.doi.org/10.1126/science.1251554>>
2. Branscomb, Lewis, 'A Focused Approach to Society's Grand Challenges', *Issues in Science and Technology*, 25 (2009) <<http://issues.org/25-4/branscomb-4/>>
3. Branscomb, Lewis, and Andrew Rosenberg, 'Science and Democracy', *The Scientist*, 2012  
<<http://www.the-scientist.com/?articles.view/articleNo/32663/title/Science-and-Democracy/>>
4. Fukuyama, Francis, and Caroline Wagner, 'Governance Challenges of Technological Revolutions', in *Science, Technology and Governance*, ed. by John de la Mothe (Routledge, 2002), pp. 188–209  
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Optional Readings:

**November 27, 2015**

**No Class, Thanksgiving Break**

**December 4, 2015**

**Class 12: Student Presentations**

**December 11, 2015**

**Class 13: Student Presentations (if needed), Wrap-Up, Special Topics**