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

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

Professor Gabe Chan
Email: gabechan@umn.edu, Office: (612) 626-3292
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® 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. 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:

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<thead>
<tr>
<th>Assignment</th>
<th>Deadline</th>
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<tr>
<td>Policy Memo 1 (R&amp;D)</td>
<td>October 12</td>
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<tr>
<td>Final project outline</td>
<td>October 23</td>
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<tr>
<td>Policy Memo 2 (environmental regulation)</td>
<td>November 2</td>
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<tr>
<td>Final project first draft</td>
<td>November 23</td>
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<tr>
<td>Final project presentation and discussion</td>
<td>December 4/11</td>
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<tr>
<td>Final project final draft</td>
<td>December 14</td>
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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:


2. President Obama at the National Academies of Sciences. 2009. 38 min or 15 pages


Optional Readings:

- Bush, Vannevar, Science: The Endless Frontier, 1945
- National Science Board, Science and Engineering Indicators 2014, 2014 (skim chapters and data)
- 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:


Debate Topic: Gene Patenting

Optional Readings:


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:


Case Topic: Bay-Dole Act

Optional Readings:


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:


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:


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/gdale/publications/C-B%20pamphlet%20final.pdf>


Case Topic: Particulate matter

Optional Readings:


October 16, 2015
Class 6: Spheres of Environmental Policy

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

Required Readings:


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:


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:

5. Keith, David, A Critical Look at Geoengineering against Climate Change <http://www.ted.com/talks/david_keith_s_surprising_ideas_on_climate_change>
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:


Case Topic: Cape Wind (tent.)

Optional Readings:


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:


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:


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