Science, Technology, and Public Policy  
CTY Course Syllabus

Course Description:

Human beings are in the midst of constructing a new world through science and technology. This is taking place at an accelerating speed in both developed and developing countries. (Indeed, science and technology are essential to what we commonly think of as ‘development’ and its underlying ideal of human flourishing or well-being.) The kind of world that emerges will be determined not simply by the expanding knowledge of science or the increasing powers of technology. It will depend more significantly on decisions or policies made by governments, NGOs, corporations, universities, and individuals. These decisions in turn hinge on our visions, implicit or explicit, about good and bad, right and wrong, justice and injustice — and by our abilities to enact ideals in the face of limited knowledge and temptations to ease or arrogance.

This course introduces students to key themes and topics in science and technology policy and to some of the most important decisions facing human civilization. It aspires to cultivate in students the virtues of reflective thinking, cogent argument, and informed judgment so that they may go on to wisely shape future policies with and for science and technology. Emphasis will be placed on exploration – of relevant ideas, events, texts, and opinions – more so than an obligation to learn or to leave knowing ‘the basics’ of science policy.

Learning Objectives:

- Improve basic skills in critical thinking, reading, writing, debating, and speaking.
- Develop a broader and deeper understanding of science, technology, public policy, and the many ways they interact. This includes a familiarity with key themes and perspectives, influential texts and institutions, and important topics and policy issues.
- Cultivate an ability to analyze a policy process, define a policy problem, and generate and assess alternative courses of action.

Assessments:
The following assessments are designed to gauge understanding of the course material and to demonstrate the capacity to apply skills learned throughout the course. These activities will inform the instructor’s narrative evaluations of each student at the end of the course.

- Participation in discussions, debates, and activities
- Group presentations on reading assignments (Days 3, 6, and 8)
- Open-note short essay exams (Days 5 and 10)
- Research project paper
- Research project presentation

Class Norms, Expectations, and Integrity:

Class time will consist of a mixture of lecture, reading, learning activities, and discussion. Students are expected to participate, stay engaged, and be mindful of their peers. Students are encouraged to respectfully challenge what the instructor and other students say and to critically examine their own beliefs. Devil’s advocates are welcome! However, there will be no ridiculing.
mean-spirited teasing, or bullying. All interactions are expected to be civil and open-minded. We are all responsible for creating an environment where everyone feels safe to voice their questions and ideas.

Course Schedule:

Sunday Evening, Week 1
- Introductions of instructor and TA and icebreaker games (20 min.)
- Survey to indicate student’s interests and opinions regarding topics to be covered in the course (30 min.)
- Students read and sign Honor Code and Computer Lab use forms (10 min.)
- Game: “Two truths and a Lie” (60 min.)

Monday, Day 1: Setting the Stage

Morning
- Pre-assessment (30 min.)
- Decorate name placards and journals (30 min.)
- Overview of syllabus/course (20 min.)
- Break (15 min.)
- Read “Bird Flu Paper is Published After Debate” by Donald McNeil, Jr. (2012) (25 min.)
- Students identify and debate policy questions raised by case. Are there multiple policy issues? If so, which one(s) is (are) the most pressing? What were the major policy outcomes, and did they address the ethical and/or political concerns operative in the case? (60 min.)

Afternoon
- Continue discussion of policy dimensions of H5N1 research. Instructor solicits students’ help in mapping the policy context, including identifying relevant stakeholders, policy issues, ethical issues, political dimensions, and the relationships between these. Discussion of the interests and values of various stakeholders as an introduction to policy analysis (60 min.)
- Break (10 min.)
- Read “The Proactionary Principle” by Max More (2005) (50 min.)

Evening
- Discuss “The Proactionary Principle,” focusing on understanding how More’s approach would shape public policy and the kinds of consequences adhering to such a principle would entail (70 min.)
- Break (10 min.)
- Watch Nova documentary “Do Scientists Cheat” (1988). Instructor guides students through basic concepts, research organizations and institutions, regulatory and funding agencies, and dominant viewpoints involved in the issues raised by scientific misconduct (40 min.)
Tuesday, Day 2: Scientific Norms and Research Misconduct

Morning
- Read “The Normative Structure of Science” by Robert K. Merton (1942). Activity: the reading is split into five sections, and student groups of three are assigned to read each section (70 min.)
- Break (20 min.)
- Groups discuss and summarize the main points among themselves, then discuss their findings with the class. Instructor participates in the discussion to point to relevant passages or arguments and to answer questions (90 min.)

Afternoon
- Finish Nova documentary “Do Scientists Cheat?” and discuss institutional and personal pressures experience by scientists that contribute to dishonest research practices (50 min.)
- Break (10 min.)
- Activity: students form three groups of five and produce a conceptual map of the ethical, political, social, and legal dimensions of scientific misconduct, including the various types of misconduct (i.e. falsifying data, fabricating test subjects, trimming or cooking data) (40 min.)
- Students draw their maps on the board and compare with other groups (20 min.)

Evening (2 hrs. with 10 min. break)
- 1/3 of students read Chapter 5 “Problem Orientation: Focusing on Problems to Find Solutions,” in The Policy Process by Susan Clark, and discuss in small group, preparing to present to class next day.
- 1/3 of students read Chapter 1 “Reason, Rationality, and Public Policy: The Puzzle of Human Behavior,” in Analyzing Public Policy by Dipak Gupta, and discuss in small group, preparing to present to class next day.
- 1/3 of students read Chapter 4 “The Policy Process,” in Analyzing Public Policy by Dipak Gupta, and discuss in small group, preparing to present to class next day.

Wednesday, Day 3: Policy Process and Research Paper

Morning
- Final preparations and practice for small groups to present their chapters to class (60 min.)
- Break (15 min.)
- Groups present their chapters on the policy process using the board or projector to illustrate main points (15 minutes each for presentation, followed by Q&A from class) (80 min.)
- Students evaluation others presentations (instructor provides handout for this). As a group, the class discusses the mechanics of an effective presentation (25 min.)
**Afternoon**
- Students form groups of three for the course-long research paper project (5 min.)
- Instructor describes the research paper format and expectations (e.g., length of paper and presentation guidelines) and provides some ideas for paper projects (15 min.)
- Research teams discuss and browse online to find a suitable topic. Instructor visits teams to help brainstorm (40 min.)
- Break (10 min.)
- Instructor meets with research teams to finalize topic selection and to discuss appropriate and trustworthy sources of information for their case study. Research teams begin working on their project (if time permits) (60 min.)

**Evening**
- Read “The Philosophy of the Technology of the Gun” by Evan Selinger (2012). Discuss as a group, attempting to come to a clear understanding of the argument and how it challenges common assumptions of what technology is (90 min.)
- Break (10 min.)
- Video: “NRA’s Executive VP Wayne La Pierre calls for armed security guards in schools.” Students take notes through the video, attempting to outline his problem orientation in the framework provided by Clark in Chapters 5 and 7 (given in handouts) (20 min.)

**Thursday, Day 4: Technology, Society, and the Tech-fix**

**Morning**
- Finish NRA video. Discussion about the NRA problem definition, including introduction to basic logic (i.e. what makes for a well-structured argument), identification of policy problems and given problem definitions, and how guns are conceptualized in those definitions (e.g., as neutral instruments, as giving ‘stage directions,’ as deterministic, etc.) (80 min.)
- Break (15 min.)
- Continue discussion concerning the influence of social perspectives, personal biases, and special interest advocacy in the design of policies for technology. Instructor outlines dominant attitudes toward technology (e.g., instrumentalism, technological solutionism, or the “tech fix”) and prompts students to consider how these perspectives shape particular policies (85 min.)

**Afternoon**
- In the computer lab, students work on researching group projects. Instructor and TA assist groups in refining problem definition, searching for relevant information, and identifying reliable sources (2 hours with 10 min. break)

**Evening**
- Activity: Collaborative reading and discussion of “Do Artifacts Have Politics?” by Langdon Winner (1984). Main question to consider: does technology determine society, or is it the other way around? (2 hrs. with 10 min. break)
Friday, Day 5: Science in Society

Morning
- Warm-up journal swap and discussion (40 min.)
- Break (15 min.)
- Interactive lecture on the history of STP in the U.S. and discussion of Bush’s vision for American science. Emphasis given to detailing the prevalence of and challenges to Linear Model policymaking – what Dan Sarewitz calls the “myth of accountability.” (80 min.)

Afternoon
- First open-notes essay exam. Students choose three of six prompts and write a short essay for each. Those who finish early read “Beyond Basic and Applied” (60 min.)
- Break (10 min.)
- Continue lecture and discussion of linear model, noting especially Pielke’s and Byerly’s criticisms of it (60 min.)

Sunday Evening, Week 2
- Read “Science Policy and the Expectation of Health” by Adam Briggle (2012) (70 min.)
- Watch and listen to Tom Lehrer’s song “Wernher von Braun” – instructor briefly explains von Braun’s career and the impetus for the song (5 min.)
- Fishbowl debate: How far do scientists’ responsibilities extend? How can we ensure that research results in valued social outcomes, and not harmful ones? (35 min.)
- Journal reflections (10 min.)

Monday, Day 6: Science in Environmental Policymaking

Morning
- ½ of students read selections from “Science and Environmental Policy: An Excess of Objectivity” by Daniel Sarewitz (2000), and the other ½ read selections from Merchants of Doubt by Naomi Oreskes and Erik Conway (2010). Four groups prepare presentations (two groups for each reading), complete with written outlines that will be distributed to the class later (90 min.)
- Break (15 min.)
- Student presentations of their readings and interpretations of the author’s arguments. (10-15 minutes per group) (75 min.)

Afternoon
- Students work on research papers in the computer lab. Turn in outline of their paper to demonstrate progress. Instructor meets with teams to discuss outlines (2 hrs. with 10 min. break)
Evening
- Instructor provides brief introduction to hydraulic fracturing and shale gas development (15 min.)
- Watch the short film “The Sky is Pink” by Josh Fox (2012) (20 min.)
- Watch the short film “Truth Land” by Energy In Depth (2012) (5 min.)
- Discuss the relative merits of the Sarewitz’s and Oreskes/Conway’s different approaches for explaining the disagreement over fracking (30 min.)
- Break (10 min.)
- Lecture and discussion on U.S. federal R&D budget process with comparison to other nations and private sector. How is research funding allocated in different nations and sectors of society? What kinds of priorities are shared in common – or not? What should be top R&D priorities? (30 min.)
- Journal reflections (10 min.)

Tuesday, Day 7: Policy-for-Science and Research Priorities

Morning
- Warm-up: journal swap (45 min.)
- Read selections from “NSF under the Microscope” by Senator Tom Coburn (2011) and “Academic Funding and the Public Interest: The Death of Political Science” by Sarah Kendzior (2013) (20 min.)
- NSF Award Search Activity. Instructor explains the Advanced Award Search function on the NSF website and (using the classroom projector system) enters “Political Science” into the ‘Program’ box. Students browse abstracts of awards, identify some that they think are of high value and some that they think are of low value. Discussion focuses on exploring criteria for judging the value of research investments (20 min.)
- Break (15 min.)
- Activity: Mock peer review. Small groups will be provided one-page summaries of a few current NSF grants chosen by the Instructor. Treating them as if they were proposals, students discuss their relative merits as if they were the peer review panel. Considering there is only enough money for one project, which proposal should be funded and why? What other information do they think is required, if any? (60 min.)

Afternoon
- Students work on research papers in the computer lab. Turn in outline of their paper to demonstrate progress. Instructor meets with any pairs struggling to make progress (2 hrs. with 10 min. break)

Evening (2 hrs. with 10 min. break)
- ¼ of the students read “A Neoliberal Economics of Science” by Sheldon Krimsky (2011) and discuss in small group, preparing to present to class next day.
- ¼ of the students read “The Privatization of State Universities: It Makes Sense” by Richard Vedder (2012) and “Society Shouldn’t Pay for Your Higher Education” (2012) by George Leef and discuss in small group, preparing to present to class next day.
- ¼ of the students read “The End of the University as We Know it” by Nathan Harden (2013) and discuss in small group, preparing to present to class next day
- ¼ of the students read “The End of the University?” by Louis Betty (2013) and discuss in small group, preparing to present to class next day.

**Wednesday, Day 8: The Function and Future of the University**

**Morning**
- Finalize preparations for student presentations (15 min.)
- First two groups of students present on the corporatization and privatization of higher education and answer questions from the class (10 minutes for each presentation, followed by Q&A from class). Between presentations, Instructor provides additional information about the history of universities and debates about their purpose (40 min.)
- Break (15 min.)
- Second two groups of students present on the virtualization of higher education and answer questions from the class (40 min.)
- Presentation evaluations and discussion regarding the mechanics of public speaking (20 min.)
- Discuss and debate: Does it make sense to go to college anymore? What is the value of universities today? (30 min.)
- Journal reflections (20 min.)

**Afternoon**
- Students read the altmetrics manifesto (20 min.)
- Instructor lectures on alternative ways to account for and to disseminate academic research. What is the importance of evaluating the outcomes of scientific research for science policy? (30 min.)
- Break (10 min.)
- Students work on research papers in the computer lab (60 min.)

**Evening**
- Video about designer children and the case of intentionally choosing a deaf child. Students will be asked to identify the policy questions raised by the technologies discussed as they watch the video (10 min.)
- Outline, clarify, and debate policy issues raised in the film (80 min.)
- Break (10 min.)
- Journal reflections: Would you use genetic technology to ‘design’ or ‘tailor’ your children? Why or why not? (20 min.)

**Thursday, Day 9: Biotechnological Enhancements and Military Research**

**Morning**
- Warm-up: journal swap and discussion (30 min.)
- Read the transhumanist manifesto. Instructor-led discussion focusing on the ethical and policy questions raised when biomedical science and technology are used for ‘non-medical’ purposes (30 min.)
- Break (15 min.)
- Read “Biomedical Enhancements Entering a New Era” by Maxwell Mehlman (2009) (50 min.)
- Silent sticky-note debates on questions either posed by instructor or generated by students. Examples: Should the NIH fund research into smart pills to enhance intelligence? If there was a pill or a genetic therapy that could boost a child’s intelligence or athletic ability (and it was safe, cheap, and readily available), wouldn’t parents by obligated to give it to their children? (25 min.)
- Wrap-up discussion of answers on the sticky notes (30 min.)

**Afternoon**

- A quick look at the R&D being funded by Defense Advanced Research Projects Agency (DARPA) (10 min.)
- Read “Military Funds, Moral Demands: Personal Responsibilities of the Individual Scientist” by Douglas Lackey (1994) (40 min.)
- Break (10 min.)
- Activity: Formal debate on the question, under what conditions should scientists and engineers develop tools and weapons for the military? Students form pro and con teams, elect judges, and research the topic in the computer lab (60 min.)

**Evening**

- Students finish preparing their statements for the debate (30 min.)
- Debate conducted: Pro team gives a 10 minute opening statement, followed by a 10 minute statement from the con team and two five-minute rebuttal rounds. Judges then get five minutes each to ask the teams questions, and then deliberate to decide the winner (60 min.)
- Debate de-brief and peer evaluations (30 min.)

**Friday, Day 10: Life Online… and Life on Mars?**

**Morning**

- Read “Friendship Does Not Compute” by Peter Lopatin (2012) (30 min.)
- Discussion about how the internet is changing the way we think, read, and relate with one another. As others have put it, is Google making us stupid, or is stupid making us Google? (60 min.)
- Break (15 min.)
- Activity: To what extent do you agree with Lopatin that the internet is contributing to greater narcissism and devotion to fantasy worlds at the expense of the ‘real’ one? Draw a continuum on the board, from “strongly agree” to “strongly disagree.” Students place sticky notes representing their opinions. Positions are re-evaluated after further discussion to determine if anyone’s opinion changed (50 min.)

**Afternoon**

- Lecture and discussion: Where do you get news and information about the world? What is the internet doing to democracy? (50 min.)
- Break (10 min.)
- Groups work on research projects in the computer lab while instructor and TA meet with them individually to assess progress (60 min.)

Sunday Evening, Week 3
- Review Week 2 material and take second open-notes essay exam (90 min.)
- Watch “Does the World Need Nuclear Energy?” (Ted Talk forum, 2010) (30 min.)

Monday, Day 11: Research Projects and Energy Policy

Morning
- Students work on research papers and presentations in the computer lab (2 hrs.)
- Break (15 min.)
- Lecture on the pros and cons of leading energy resources – what kinds of energy sources does this country use, and in what proportion? What kinds of technologies are on the horizon of alternative energy sources? Why aren’t alternative sources currently able to offset reliance on fossil fuels? Includes examples from the ARPA-E program (20 min.)
- Discussion of the current state of energy resources. Was one side of the nuclear debate more convincing than the other? Why or why not? What kinds of policy rationales were being used to advocate for and against developing nuclear energy capacity? (25 min.)

Afternoon
- Pair/share activity: Students work in pairs to design an ideal energy policy. What should be the overriding principle for deciding how to meet energy needs safely and effectively? Pairs take turns sharing their energy policy with the class (2 hours with break)

Evening (2 hrs. with break)
- Read selections from “Energy Strategy: The Road Not Taken” by Amory Lovins (1976)
- Read selections from Introduction and Chapter 5 in Big Coal by Jeff Goodell (2006).
- Journal Reflections: In one sentence each, identify the main “take-home” point of the three readings. What are some points of agreement and/or disagreement between the authors?

Tuesday, Day 12: Energy and Climate Policy

Morning
- Students work on research projects in computer lab (3 hrs. with break)

Afternoon
- Students work on research projects in computer lab (2 hrs. with break)

Evening (2 hrs. with break)
- Read “Global Warming’s Terrifying New Math” by Bill McKibben (2012).
- Demonstration of Google Glass and discussion of the future of technology on a finite planet.
Wednesday, Day 13: Healthcare and Agriculture

Morning
- Discuss and debate the connections between energy production/consumption and the policy issues raised in McKibben’s article – particularly those concerning international efforts of the IPCC or USGCR (90 min.)
- Break (15 min.)
- PBS Frontline documentary “Hot Politics,” about the politics and regulatory dimensions of action (and non-action) on climate change over the past three decades (60 min.)

Afternoon
- Finish documentary (20 min.)
- Group mapping exercise: Map out the various dimensions of climate change – for example, environmental impacts, social impacts, economic impacts, etc. Compare maps among groups and discuss as a class (60 min.)
- Break (10 min.)
- Read “Our Decrepit Food Factories” by Michael Pollan (2007) and watch short video about the documentary “Food Inc.” (30 min.)

Evening
- Debate activity: Students will be assigned to play the roles of various stakeholders and witnesses to deliberate the ethics of factory farming in a mock Congressional hearing (50 min.)
- Break (10 min.)
- Practice research project presentations (60 min.)

Thursday, Day 14: Research Paper Symposium

Morning
- CTY Science, Technology, and Public Policy Symposium: Groups give presentations about their course research projects in the style of an academic conference (3 hrs. with break)

Afternoon
- Post-assessment and SPEs (90 min.)
- Break (10 min.)
- Read and discuss the ethics and policy of “Why I Froze My Eggs (And You Should Too)” by Sarah Elizabeth Richards (2013) (20 min.)

Evening
- Discuss reproductive technologies and the future of family planning (30 min.)
- Watch and debate “Terraforming Mars” video. Should we seek to terraform Mars? (60 min.)
- Break (10 min.)
- Journal reflections: What will society be like 100 years from now? In what ways will things be better or worse than they are now? Write a utopia or dystopia about humanity’s future (20 min.)

Friday, Day 15: Wrapping Up

Morning
- Concluding discussion: Student share their stories with the class. Are we headed toward a utopian or a dystopian future? How could we (via policies) steer toward utopia and/or away from dystopia? (2 hrs.)