

PUBAFRS 5600 / ENVENG 5600: Science, Engineering, and Public Policy
Tuesday Online 3:55-5:15
Spring 2021

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Description:

Science and engineering underpin innovation, national security, and many other areas of public concern, including those related to Ohio State University's Discovery Themes: (1) Energy and Environment, (2) Food Production and Security, and (3) Health and Wellness. But the contexts regarding (a) investments in science, engineering, and public policy and (b) the causes and consequences of the development of scientific knowledge and engineering innovations tend to be underappreciated by those involved. For example, on one hand, funding decisions are made by policymakers—many of whom lack technical training and an appreciation of the role of government in these arenas—and, on the other hand, scientists and engineers often develop knowledge and innovations as a result of, and have relevance to, public policy. Scientists and engineers can be empowered by understanding the process of investment, support for research, and the broader influence of their work. Similarly, policy-makers can benefit from understanding how science and engineering unfolds and how to use scientific and technical information for decision-making on matters of national and international importance. This course is designed to serve both perspectives—those making policy for science and engineering and those using science and engineering to inform policy—with a survey of policy, processes, and contexts for science, engineering, and innovation in the United States.

The class will present an overview of (a) the history of the interactions between science, engineering, and public policy in the United States and in the context of global concerns (e.g. climate change, competitiveness); (b) how various the federal government, universities, and corporations conduct and fund science and engineering; (c) how public sector interests and processes influence, and are influenced by, science, engineering, and public policy; and (d) policy analytic approaches for science and engineering. Case studies devoted to the science, engineering, and policy of the University's Discovery Themes will help students apply policy analysis and developments in science and engineering to understand the relevance to real-world needs and policies.

Class discussion is an essential component of this course and in the past we have had a guest lectures from a variety of people, including Prof. Bharat Bhushan (a former ASME Congressional Fellow), Mark Reichenadter (former Chief Operating Officer of Stanford Linear Accelerator Center National Accelerator Laboratory), David Williams (Dean of the College of Engineering) and individuals from Virgin Galactica, the Ohio Department of Transportation, and elsewhere. We will be lining up guest speakers for this term, too. These events will be recorded on video and placed on Carmen for you to view outside of class.

Learning Objectives and Student Outcomes:

Through this course, you will:

1. Examine the processes and contexts related to science, engineering, and innovation and understand how they reflect values, goals, and interests.
2. Synthesize strategies for policy analysis and evaluate a real-world topic related to science and engineering using these strategies.
3. Develop the capability to identify the relevance of advances in scientific knowledge and engineering developments to broader public policy issues.
4. Analyze cases that involve the interactions between science, engineering, policy, public choice, risk, and consequences in fields related to Ohio State University's Discovery Themes and other current issues.

Learning Objectives and Student Outcomes:

This course prepares engineering students to attain the following Accreditation Board of Engineering and Technology (ABET) educational objectives:

ABET Student Learning Outcomes
1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

This course may be counted as a technical elective in Civil, Environmental, and Geodetic Engineering, and in Mechanical Engineering, and is one of the select core courses in the Environmental Science Graduate Program. The course also fulfills the Global Option in the College of Engineering and is one of the core courses in the undergraduate minor in Science and Engineering in the Public Interest.

Class Participation and Conduct:

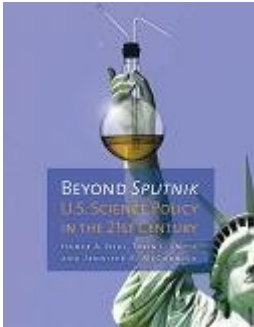
Advance reading and active participation are critical elements of success in this course (and in life). Lively and active discussions are effective learning mechanisms for you and your peers (and thus incorporated into your class participation grade), so be prepared to contribute to discussions during class breakout opportunities when they are offered.

¹ Please don't test me... I have worked for numerous national laboratories within the United States and still retain some privileges. In other words, I have certain resources at my disposal that are not available to the public... J

Course Requirements:

Textbook and Readings:

There is one required textbook, and other required and optional readings will be posted to the Canvas website for this course. The required textbook (below) is available through the OSU library system for free:



Homer Neal, Tobin Smith, and Jennifer McCormick. Beyond Sputnik: U.S. Science Policy in the Twenty-First Century. (Ann Arbor: University of Michigan Press, 2008) ISBN 0472033069 <http://www.science-policy.net/>

You can download the book by chapter by logging into the OSU library system (library.osu.edu), searching for “Beyond Sputnik”, choosing the option that lists the text as an eBook, clicking on “Find It @OSU” under “Find a copy online”. That will take you to Project Muse, where all of the content is available for you to download.

You are expected to read all of the readings prior to class. Many readings will be timely due to recent events and the goal is to address the most recent developments as possible. As such, a number of readings will be posted to the Canvas course website only a couple days in advance of the class session. You will be assessed on your ability to demonstrate knowledge of the material through your in-class contributions and other assignments. You are welcome to draw from material in other classes to support course work. You are also encouraged to read broadly (e.g. New York Times, Scientific American, brainpickings.org), to watch The West Wing (on Netflix), and to bring relevant issues from current activities in public affairs to class to enhance our discussion.

Assignments:

You will be assessed through weekly quizzes given on Friday as well as, a midterm exam, two short papers, and a class presentation based on one of those papers.

Grading and Assignment Detail

Weekly quizzes 10@ 5 points each	50%
Midterm (due March 5 th):	10%
Short Paper #1: Policy Analysis Frameworks (due 2/19):	10%
Short Paper #2: Policy Analysis Application (due 4/16):	10%
Team Presentation -- Policy Analysis	20%

Class Participation

There are few things more important to success in engineering, in public affairs, and in life than effective communication and the ability to conduct yourself in a way that ensures your message is clear. This class mixes lectures, case studies, teamwork, and discussions; it is a laboratory for you to refine your communication skills. You are expected to be prepared, to thoroughly process and synthesize information, and to incorporate your thoughts and experiences. In other words, you will need to be reading and thinking as we proceed through the semester. As a result, regular attendance and active participation are necessary.

Short Mid-Term Exam:

There will be one short mid-term exam designed to encourage you to synthesize and apply the class materials. It will be based on the readings, lectures, and discussions. The midterm accounts for 10% of your final grade and it will cover materials up to the exam date. The mid-term will be a take-home assignment that is distributed on March 1 and it is due on March 5.

A grading rubric will be provided to help you prepare an excellent midterm.

Short Papers and Presentations:

Understanding and applying policy analysis to scientific and engineering issues is one major aspect of this course. These writing assignments will develop those capacities. You will write two short papers during the semester. These papers will differ depending on whether you are an undergraduate student or a graduate student.

- A grading rubric will be provided to help you prepare a quality paper.

Short Paper #1:

The assignment will be distributed at the end of class on February 15 and the paper will be due by 11:59 pm on February 19. The assignment will have a list of approaches to policy analysis. A grading rubric will be made available.

Short Paper #2:

The assignment will be distributed on March 15 and it is due by uploading to the course website by 11:59 pm on March 19. A grading rubric will be made available.

Team Project and Participation Assignment

Teams will be assigned and each team will be asked to consider a science and/or engineering policy case that is currently being debated in policy circles. The teams will roll play a policy debate, taking different parts, and come together to write a policy brief on the topic. Students will be assigned to teams by undergraduate or graduate status. Details will be provided close to the date of the assignment. This final paper will serve as the final task in the course, and it is due by 11:59 on April 23.

Grading Scale:

	B+: 87 – 89	C+: 77-79	D+: 66 - 70
A: 93 – 100	B: 83 – 86	C: 73-76	D: 63 - 66
A-: 90 – 92	B-: 80 – 82	C-: 70-72	E: 62 or below

Course Policies

Your work should be original. Academic and personal misconduct are defined and dealt with according to the procedures in the Code of Student Conduct: http://studentlife.osu.edu/pdfs/csc_12-31-07.pdf. Avoid excessive quotation and paraphrasing of other's work with or without citation. While timely indication of one's intent to be absent is expected, when possible, this does not waive the obligation to submit assigned work on time.

ACADEMIC INTEGRITY (ACADEMIC MISCONDUCT) ²

The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's *Code of Student Conduct*, and that all students will complete all academic and scholarly assignments with fairness and honesty. Failure to follow the rules and guidelines established in the University's *Code of Student Conduct* may constitute "Academic Misconduct." Sanctions for misconduct could include a failing grade in this course and suspension or dismissal from the University.

In the Ohio State University's *Code of Student Conduct*, Section 3335-23-04 defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination.³ Ignorance of the University's *Code of Student Conduct* is never considered an "excuse" for academic misconduct. Other sources of information on academic misconduct (integrity) to which you can refer include:

- *The Committee on Academic Misconduct*: <http://oaa.osu.edu/coam.html>
- *Ten Suggestions for Preserving Academic Integrity*: <http://oaa.osu.edu/coamtensuggestions.html>

- *Eight Cardinal Rules of Academic Integrity*: www.northwestern.edu/uacc/8cards.html

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me. I prefer to not have to make a decision on whether or not to bring someone up on charges of academic misconduct. For your sake and mine, please avoid coming close to the point where I have to make a decision.

Accommodation Policy

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

² From: <http://oaa.osu.edu/coamfaqs.html#academicmisconductstatement>

COURSE CALENDAR

Wk	Dates	Topics		Activities	Assignments
1	12-Jan	US Science & Engineering Policy in the World	Tuesday class	Overview of Course; Syllabus review	Neal Ch 1 & 2 & 17 Bush Endless Frontier On Carmen
Online	14-Jan	Agencies and Actors	Online	Friday Quiz 1	
2	19-Jan	Where is US Science Policy Made?	Tuesday class		Neal 3, 4, 5 Also, please see "Read Ahead" On Carmen
	21-Jan	Role of Congress	Online	Friday Quiz 2	
3	26-Jan	Policy analysis for scientists and engineers	Tuesday class	Class discussion on robotics in the workplace	Bardach's Eight Steps for Policymaking on Carmen Blog post: Who are 'stakeholders' in Research?
	28-Jan	Frameworks for policy analysis	Online	Friday Quiz 3	
4	2-Feb	Critical role of advocacy	Tuesday class	Class discussion on facial recognition software	Listen: The Received Wisdom Podcast, Episode 8 Facial Recognition; Neal Ch 6 & 8
	4-Feb	Interview video online Leshner	Online	Friday Quiz 4	
5	9-Feb	Scientific Infrastructure and Investment	Tuesday class	Topic Discussion; online videos	On Carmen
	11-Feb	Interview video online Hutchinson	Online	Friday Quiz 5	
6	16-Feb	Understanding Science Agencies	Tuesday class	Topic Discussion: Vaccines	Neal ch 11, 13, 18 Additional reading on Carmen
	18-Feb	Interview video online- Levinson	Online	Short paper #1 due on Friday by midnight; no quiz	
7	23-Feb	BREAK DAY	Tuesday class		On Carmen
	25-Feb	<i>Online only this week</i>	Online	Friday Quiz 6	
8	2-Mar	Case 1: Health and Wellness	Tuesday class		On Carmen
	4-Mar	Interview online	Online	Mid term due on March 5 by midnight; no quiz	
9	9-Mar	Case Study: Food and Security	Tuesday class	Lecture	On Carmen
	11-Mar	Interview online	Tuesday class	Friday Quiz 7	
10	16-Mar	International relations and science policy	Tuesday class	Prepping group projects and peer review	On Carmen
	18-Mar	Interview online	Online	Writing assignment due on March 19 by midnight; no quiz	
11	23-Mar	US science and engineering in national laboratories	Tuesday class	Group projects	On Carmen
	25-Mar	Interview online	Online	Friday Quiz 8	
12	30-Mar	Case study: Energy and the environment	Tuesday class		On Carmen
	1-Apr	BREAK DAY	Online	No Friday Quiz	
13	6-Apr	Innovation and public policy	Tuesday class	Online tutorials	On Carmen
	8-Apr	Interview online	Online	Friday Quiz 9	
14	13-Apr	STEM education, mobility, and research	Tuesday class	Team Projects meetings	On Carmen
	15-Apr		Online	Friday Quiz 10	
15	20-Apr	Grand challenges for the future; team presentations	Tuesday class	Team Projects	On Carmen
	22-Apr		Online	Team Projects due by Friday night by midnight; no quiz	