

**SCIENCE, TECHNOLOGY, AND THE PUBLIC GOOD**  
**PUBLIC POLICY 474**  
**WINTER 2019**

Prof. Joy Rohde  
Office: 4211 Weill Hall  
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Course: T/Th 1-2:20 pm  
Meets in: 1230 Weill Hall

Office hours: Tues. 11:30-12:30; Thurs. 2:30-3:30, sign up via Canvas

**COURSE DESCRIPTION**

Researchers, policymakers, and the American public look to science and technology to address some of society's most pressing challenges, from climate change to public health to economic growth. But such efforts are the subject of controversy and concern. Think of fears that automation will create mass unemployment, that biotechnology threatens human health and natural biodiversity, or that human genome editing will reignite eugenic policies. This course examines the competing values that shape debates over how and when science and technology provide social benefits. Its goals are 1) to equip students with the interdisciplinary skills necessary to advocate for socially responsible science and technology policy; and 2) to provide concepts and tools for reasoning and writing about the normative challenges that shape a variety of policy challenges, both within and beyond science and technology.

Students who take this course will learn:

- The role of science and technology in American democracy, including the S&T policy landscape in the United States
- How to analyze the complex relationships between innovation, society, and public policy
- Key ethical concepts relevant to S&T policy, including utility, liberty, justice, and democratic deliberation
- How S&T policy can be used to help solve social problems, and how unreflective policy can exacerbate or lead to new problems
- How to integrate ethical considerations into policy analysis
- How to think and write in a sophisticated and reflective manner about value-based disputes in policy.

This course fulfills the Ford School Values & Ethics requirement. No scientific, technical, or ethics background is necessary.

**COURSE REQUIREMENTS**

<i>Class participation</i>	20%
<i>Class Discussion Board</i>	25%
<i>Written Assignments</i>	
<i>Research Funding Testimony</i>	15%
<i>Controversy Paper Proposal</i>	P/F
<i>Controversy Backgrounder</i>	20%
<i>Governance Recommendation</i>	20%

- A. **Class participation.** This is a discussion-intensive course. Preparation, attendance, and active participation are mandatory and will be important parts of your final grade. Each class session includes discussions and activities that require that you have read the day's assigned readings. Your preparation for class should not be a passive process of absorbing facts from readings; rather, while reading, you should actively identify (and write down!) questions you have, possible avenues of discussion, and potential points of application of the readings to current events.
- B. **Class Discussion Board.** To assist you in fulfilling (A), during the course of the semester you will post on the class discussion board in advance of each class meeting. Discussion board posts are designed to facilitate in-class discussion of the readings. They will be graded on a check minus (1 point), check (2 point), check plus (3 point) basis, with the expectation that most posts receive a check. Posts should demonstrate that you carefully read and thought about the assigned text(s).

**Tuesdays:** On Tuesdays, students will respond with posts to a prompt, which Prof. Rohde will post by the previous Thursday at 5 pm. These should be 200-300 words and must be posted by **12 pm Tuesday**. The discussion posts and comments should not simply summarize the reading. They are think pieces—opportunities for you to refine questions and insights from the readings. Your entries should reflect holistically on the readings assigned for the day, not just one piece if more than one is assigned. Treat these posts as formal pieces of writing. Be clear and succinct.

**Thursdays:** On Thursdays, each student will **post 2 discussion questions by 12 pm**. Incorporating specific references to the text(s), including quotations, is highly recommended. Each question should represent one of the following types:

1. Clarification/Comprehension (e.g., What does X mean?)
2. Analytical/Interpretive (e.g., How does X evidence relate to Y point?)
3. Synthetic/Evaluative (e.g., Are you convinced by the author's argument that X)
4. Connective/Comparative (e.g. How does X's argument compare to Y's from last week?)
5. Provocative/Argumentative (e.g., Doesn't evidence X undermine the author's point Y?!)
6. Applied/Extended (e.g. What light does X point shed upon current problem Y?)

C. **Written Assignments:**

1. **Research Funding Written Testimony:** Following our in-class debate about research funding policy, your team will write up your formal Congressional testimony. This assignment assesses your understanding of the research policy landscape and the different value-based orientations that underlie controversies over research funding in the United States. Your grade will also reflect your team's evaluation of your individual and collective efforts.

2. **Science or Technology Policy Controversy Papers**

- a) **Topic Choice.** Choose an ongoing controversy related to a specific science or technology policy that you want to focus on for your last two papers. There are a variety of possibilities to choose from, but it is very important that you choose a current, specific controversy that is being actively discussed by stakeholders and/or policy officials. Controversies are likely to focus on one of two questions: 1) should

- an area of science or technology move forward (e.g., proposals for developments pertaining to synthetic biology, geoengineering, natural resource development, etc.); or 2) should we regulate a particular area of science and technology (e.g., greenhouse gases/fossil fuels, genetically modified organisms, genetic testing). Choose a local, state, or national context in which an actual controversy is taking place. Answer the following questions: What are the main issues animating the controversy? What, if any, is the history of the controversy (briefly)? What is the evidence of a live, ongoing controversy? Who are the stakeholders involved? Identify at least three sets of stakeholders. Who are the decision-makers (the policymakers) involved? List the key ones. Who are the experts involved? Identify expert organizations, disciplines, etc. whose expertise is valuable to solving the policy problem. Answer: Why is this controversy of interest to you in the context of this course? Is any specific policy or legislation being debated?
- b) **Backgrounder.** This paper should provide an analytic explanation of the values and key players that animate your controversy. This paper should be no more than 1000 words.
- c) **Governance Recommendation.** For this paper, you will choose one or more of the approaches designed to resolve science and technology policy controversies that you think is/are best suited to help address or resolve your policy controversy. You will write a memo to a decision-maker involved in the controversy (i.e. someone who would be in a position to implement your proposal) that: 1) explains why your approach is the best means to address your controversy; and 2) provides a blueprint for implementing your approach. This paper should be no more than 1200 words.

### **COURSE POLICIES**

1. Attendance: Because this course depends heavily upon discussion and in-class scenarios, I expect students to make every effort to attend all class sessions. **Please notify me in advance if you will miss class;** excused absences can be granted for things like illness and family emergencies, but only if I hear from you **in advance**. Any unexplained absences will negatively affect your grade. So will repeated tardiness; I expect you to arrive on time. Please also refrain from going in and out of the room during class.
2. Late assignments: Extensions require arrangements with the instructor made well in advance of the due date. Late assignments will lose **five points for each 12 hour period**, or fraction thereof, that they are late.
3. Academic honesty: All students are expected to abide by the University's standards of academic honesty, integrity, and professionalism. For details, see [http://www.rackham.umich.edu/policies/academic\\_and\\_professional\\_integrity/](http://www.rackham.umich.edu/policies/academic_and_professional_integrity/).
4. Electronic devices: **Laptops and other devices are NOT allowed in class.** While I recognize that this may cause consternation, such technologies negatively impact the character and quality of class discussion. Because discussion is so important to the intellectual task we face, the costs of laptops outweigh the benefits. Out of respect to the instructor and your fellow students, **put your cell phone away for the duration of class.**

5. Syllabus: Because many topics we cover are subjects of ongoing discussion, I may make occasional changes to the course readings over the semester. I will always notify you in advance of any changes.

## FORD SCHOOL AND UM POLICIES

**Inclusivity at the Ford School:** Members of the Ford School community represent a rich variety of backgrounds and perspectives. We are committed to providing an atmosphere for learning that respects diversity. While working together to build this community we ask all members to:

- share their unique experiences, values and beliefs
- be open to the views of others
- honor the uniqueness of their colleagues
- appreciate the opportunity that we have to learn from each other in this community
- value one another's opinions and communicate in a respectful manner
- keep confidential discussions that the community has of a personal (or professional) nature
- use this opportunity together to discuss ways in which we can create an inclusive environment in Ford classes and across the UM community.

**Academic Integrity:** The Ford School academic community, like all communities, functions best when its members treat one another with honesty, fairness, respect, and trust. We hold all members of our community to high standards of scholarship and integrity. To accomplish its mission of providing an optimal educational environment and developing leaders of society, the Ford School promotes the assumption of personal responsibility and integrity and prohibits all forms of academic dishonesty, plagiarism and misconduct. Academic dishonesty may be understood as any action or attempted action that may result in creating an unfair academic advantage for oneself or an unfair academic advantage or disadvantage for any other member or members of the academic community. Plagiarism involves representing the words, ideas, or work of others as one's own in writing or presentations, and failing to give full and proper credit to the original source. Conduct, without regard to motive, that violates the academic integrity and ethical standards will result in serious consequences and disciplinary action.

Additional information regarding academic dishonesty, plagiarism and misconduct and their consequences is available at: <http://www.rackham.umich.edu/current-students/policies/academic-policies...>

**Accommodations for Students with Disabilities:** If you believe you need an accommodation for a disability, the University's Services for Students with Disabilities office (SSD) can be a valuable resource with which to start. In addition, if you believe you need an accommodation for a disability in any of your courses, please let the course instructor know at your earliest convenience. You need to allow sufficient time for your faculty member to respond, minimally 7 days, preferably more, in advance of when the accommodation is needed. Some aspects of courses may be modified to facilitate your participation and progress. As soon as you make your instructor aware of your needs, they can work with Student & Academic Services and/or the SSD

office to help determine appropriate academic accommodations. Any information you provide will be treated as private and confidential.

**Student Mental Health and Wellbeing:** The University of Michigan is committed to advancing the mental health and wellbeing of its students. We acknowledge that a variety of issues, such as strained relationships, increased anxiety, alcohol/drug problems, and depression, directly impacts students' academic performance. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, contact [Counseling and Psychological Services](#) (CAPS) and/or [University Health Service](#) (UHS). For a listing of other mental health resources available on and off campus, visit: <http://umich.edu/~mhealth/>.

## **COURSE READINGS**

All readings are available on Canvas.

### **I. Thinking Critically about Science, Technology, and Values**

#### **Thurs., Jan. 10: Introduction and Overview**

#### **Tues., Jan. 15: Technology and Values**

Langdon Winner, "Do Artifacts Have Politics?" in *The Whale and the Reactor: A Search for Limits in an Age of High Technology* (Chicago: University of Chicago Press, 1988), 19-39.

Jennifer Robertson, "Gendering Humanoid Robots: Robo-Sexism in Japan," *Body & Society* 16 (2010): 1-36. \*Read: 1-13, 18-36.\*

#### **Thurs., Jan 17: Who (or What) Constructs Technology?**

Ronald Kline and Trevor Pinch, "Users as Agents of Technological Change: The Social Construction of the Automobile in the Rural United States," *Technology & Culture* 37.4 (Oct. 1996): 763-795.

#### **Tues., Jan. 22: Science and Values**

Wenda K. Bauchspies, Jennifer Croissant, and Sal Restivo, *Science, Technology, and Society: A Sociological Approach* (Blackwell, 2006), selections. (28 pp.)

#### **Thurs., Jan. 24: Gender, Race, and Science**

Emily Martin, "The Egg and the Sperm: How Science Has Constructed a Romance Based on Stereotypical Male-Female Roles," *Signs* 16.3 (1991): 485-501.

Linda M. Hunt and Mary S. Megyesi, "The Ambiguous Meanings of the Racial/Ethnic Categories Routinely Used in Human Genetics Research," *Social Science and Medicine* 66 (2008): 349-361.

### **II. Rethinking Research Policy for the Public Good**

#### **Tues., Jan. 29: Origins of U.S. Research Policy**

Daniel Lee Kleinman, *Politics on the Endless Frontier: Postwar Research Policy in the United States* (Durham, 1995), 74-102, 134-39, 145-58.

Vannevar Bush, *Science: The Endless Frontier. A Report to the President* (US GPO, 1945), Pt. 6.

**Thurs., Jan. 31: Contemporary Research Policy**

Daniel Sarewitz, *Frontiers of Illusion: Science, Technology, and the Politics of Progress* (Rutgers, 1996), Chapter 1.

Paula Stephan, *How Economics Shapes Science* (Harvard, 2012), p. 111-40.

Mariana Mazzucato, *The Entrepreneurial State: Debunking Public vs. Private Sector Myths* (Public Affairs, 2017), 1-16.

**Tues., Feb. 5: Ethics Interlude: Dignity in Numbers?**

Michael Sandel, *Justice: What's the Right Thing to Do?* (2006), 31-47.

Peter Singer, "Why We Must Ration Health Care," *New York Times*, July 19, 2009.

**Thurs., Feb. 7: Patents for Public Good?**

Michael Heller and Rebecca Eisenberg, "Can Patents Deter Research? The Anticommons in Biomedical Research," *Science* 280 (1998): 698-701.

Tania Simoncelli and Sandra S. Park, "Making the Case against Gene Patents," *Perspectives on Science* 23: 1 (Spring 2015), 106-145.

**Tues., Feb. 12: Connecting Policy and Public Values**

Daniel Sarewitz, "Institutional Ecology and the Social Outcomes of Scientific Research." In *The Science of Science Policy: A Handbook*, ed. Kaye Husbands Fealing et al. (Stanford, 2011).

Ryan Meyers, "Public Values Failures of Climate Science in the US," *Minerva* 49 (2011): 47-70.

**Thurs., Feb. 14: Who Should Pay for Research and Why, Part I**

Roger Pielke Jr., "'Basic Research' as a Political Symbol," *Minerva* 50 (2012), READ \*\*pages 339-345, 355-361\*\*

Deepak Hedge and Bhaven Sampat, "Interest Groups, Congress, and Federal Funding for Science," SSRN Electronic Journal, 2011. DOI: 10.2139/ssrn.1962937.

Margaret E. Blume-Kohout, "Does Targeted, Disease-Specific Public Research Funding Influence Pharmaceutical Innovation?" *Journal of Policy Analysis and Management*. 31.3 (2012): 641-660.

David Goldston, "Science Policy and the Congress." In *The Science of Science Policy: A Handbook*, ed. Kaye Husbands Fealing et al. (Stanford, 2011).

Terence Kealey et al. "Who Pays for Science?" *CATO Unbound*, August 2013.

**Tues., Feb. 19: Who Should Pay for Research and Why, Part II**

In Class Debate!

**III. The Politics of Knowledge**

**Thurs., Feb. 21: Who is "The Public"?**

Stephen Hilgartner, "The Dominant View of Popularization: Conceptual Problems, Political Uses," *Social Studies of Science*. 20.3 (1990): 519-539.

David Roberts, "The North Carolina town that's scared of solar panels, revisited," *Vox*, December 18, 2015. <http://www.vox.com/2015/12/18/10519644/north-carolina-solar-town>

**Written Testimony due Fri. Feb. 22 at 8 pm**

**Tues., Feb. 26: Public Health and Personal Liberty**

John Stuart Mill, *On Liberty* [orig. 1859], 9-13, 73-75, 78-82.

Johan Christiaan Bester, "Vaccine Refusal and Trust: The Trouble with Coercion and Education," *Journal of Bioethical Inquiry* 12 (2015), 555-59.

Laura Hirschfield, "Vaccine Hesitancy," *Seattle's Child*.

Sabrina Tavernise, "Washington State Makes it Harder to Opt Out of Immunizations," *New York Times* Sept. 19, 2012.

**Thurs. Feb. 28: Who Counts as an Expert?**

Melissa Leach and James Fairhead, *Vaccine Anxieties: Global Science, Child Health, and Society* (Earthscan, 2007), 45-82.

**Tues., Mar. 12: Identity, Experience, and Expertise**

Harry Collins and Trevor Pinch, "The Science of the Lambs: Chernobyl and the Cumbrian Sheep Farmer," in *The Golem at Large: What You Should Know about Technology* (Cambridge 1998), 113-125.

Steven Epstein, "The Construction of Lay Expertise: AIDS Activism and the Forging of Credibility in the Reform of Clinical Trials," *Science, Technology, & Human Values* 20 (1995), 408-437.

**Thurs., Mar. 14: Justice and Dignity in the Digital Age I: Facial Recognition Technology**

Michael Sandel, *Justice: What's the Right Thing to Do?* (2006), 140-66 (142-49 optional).

David Owen, "Should We Be Worried about Computerized Facial Recognition?" *New Yorker* Dec. 17, 2018.

Andrew Burt, "Leave AI Alone," *New York Times*, January 5, 2018.

**March 17, 8pm: Controversy Papers Topic Choice due!**

**Tues., Mar. 19: Justice and Dignity in the Digital Age II: Algorithmic Governance**

Virginia Eubanks, *Automating Inequality* (St. Martins, 2017), 84-126.

Halil Toros and Daniel Flaming, "Prioritizing Which Homeless People Get Housing Using Predictive Algorithms," *Economic Roundtable*.

**IV. Rethinking S&T Governance**

**Thurs., Mar. 21: Democratization and Distribution: Wind Energy in Michigan**

Roopali Phadke, "Green Energy, Public Engagement, and the Politics of Scale," in *Routledge Handbook of Science, Technology, and Society*, ed. Daniel Lee Kleinman and Kelly Moore (Routledge, 2014), 225-45.

Michael Sandel, *Justice: What's the Right Thing to Do?* (2006), 58-69.

**Tues., Mar. 26: Policymaking in the Age of Postnormal Science**

Daniel Sarewitz, “How Science Makes Environmental Controversies Worse,” *Environmental Science and Policy* 7 (2004): 385-403.

Sheila Jasanoff, “Technologies of Humility: Citizen Participation in Governing Science,” *Minerva* 41 (2003): 223-244.

**Thurs., Mar. 28: Water Security and Democratization: PFAS in Ann Arbor**

Ryan Stanton, “PFAS Levels in Ann Arbor Drinking Water Spiked and City Isn’t Sure Why,” MLive.Com, Dec. 11, 2018. Link: <https://www.mlive.com/news/ann-arbor/2018/12/pfas-levels-in-ann-arbor-drinking-water-spiked-and-city-isnt-sure-why.html>

Ryan Stanton, “At Least 7 types of PFAS in Ann Arbor’s Drinking Water, Reports Show,” December 18, 2018. Link: <https://www.mlive.com/news/ann-arbor/2018/12/at-least-7-types-of-pfas-in-ann-arbors-drinking-water-reports-show.html>

Ryan Stanton, “Ann Arbor Water Official Explains Why City Didn’t Report PFAS Totals Sooner,” MLive, December 19, 2018. Link: <https://www.mlive.com/news/ann-arbor/2018/12/ann-arbor-water-official-explains-why-city-didnt-report-pfas-totals-sooner.html>

EPA, “Basic Information on PFAS.” Link: <https://www.epa.gov/pfas/basic-information-pfas>

EPA, “PFAS Laws and Regulations.” Link: <https://www.epa.gov/pfas/pfas-laws-and-regulations>

Daniel Lee Kleinman et al., “A Toolkit for Democratizing Science and Technology Policy: The Practical Mechanics of Organizing a Consensus Conference,” *Bulletin of Science, Technology & Society* 27.2 (2007): 154–169.

**Tues., Apr. 2: Governing Biotechnology I: GMOs**

Roberta L. Millstein, “GMOs? Not So Fast,” *The Common Reader* May 8, 2015.

<http://commonreader.wustl.edu/c/gmos-not-so-fast/>

UK Department of Trade and Industry (2003). “GM Nation? The findings of the public debate.” 6-27.

Nina V. Federoff (2011). “Burdensome and unnecessary regulation.” *GM Crops*. 2.2: 87-88.

Shobita Parthasarathy, “Lessons for CRISPR from the Missed Opportunities of Asilomar,” *Ethics in Biology, Engineering, and Medicine* 6.3-4 (2015): 305-312.

**Thurs., Apr. 4: NO CLASS**

**April 7, 8 pm: Controversy Backgrounder Due!**

**Tues, Apr. 9: Governing Autonomous Vehicles**

Bill Canis, “Issues in Autonomous Vehicle Deployment,” Congressional Research Service, May 17, 2018.

Tim Schwanen, “Peak Car?” *The Guardian*, July 18, 2017.

Albert C. Lin, “Technology Assessment 2.0: Revamping our Approach to Emerging Technologies,” *Brooklyn Law Review* 2010: 1309-1370.

**Thurs., Apr. 11: Governing Biotechnology II: CRISPR**

Congressional Research Service, “Advanced Gene Editing: CRISPR-Cas9,” December 2018.



Marc A. Thiessen, "Gene Editing is Here," *Washington Post*, November 29, 2018.  
J. Benjamin Hurlbut, Sheila Jasanoff, and Krishanu Saha, "The Chinese gene-editing experiment," *Washington Post*, Nov. 29, 2018.  
Dennis Normile, "Researcher Who Created CRISPR Twins Defends His Work but Leaves Many Questions Unanswered," *Science* Nov. 28, 2018, Doi:10.1126/science.aaw2082.  
<https://www.sciencemag.org/news/2018/11/researcher-who-created-crispr-twins-defends-his-work-leaves-many-questions-unanswered>  
Clark Miller and Ira Bennett, "Thinking Longer Term about Technology: Is There Value in Science Fiction-Inspired Approaches to Constructing Futures?" *Science and Public Policy* 35.8 (2008): 597-606.

**Tues., Apr. 16: Governing Autonomous Vehicles II**

Noam Bergman, Tim Schwanen, and Benjamin K. Sovacool, "Imagined People, behavior, and future mobility: Insights from visions of electric vehicles and car clubs in the United Kingdom," *Transport Policy* 59 (2017): 165-73.  
Cynthia Selin, "The Future of Medical Diagnostics," Scenario Development Workshop Report, The Center for Nanotechnology in Society, Arizona State University, 2008.

**Thurs., Apr. 18: Responsible Innovation**

Jack Stilgoe, Richard Owen, and Phil Macnaughten, "Developing a Framework for Responsible Innovation," *Research Policy* 42 (2013): 1568-80.

**Tues., Apr. 23: Moral Responsibility in an Age of Autonomous Weapons**

Drew Harwell, "Google Bans Development of Artificial Intelligence Used in Weaponry," *Washington Post* June 7, 2018.  
Aaron Gregg, "Microsoft, Amazon pledge to work with Pentagon following anonymous online rebukes," *Washington Post* Oct. 26, 2018.  
Employees of Microsoft, "An Open Letter to Microsoft," *Medium* Oct. 12, 2018. Link: <https://medium.com/s/story/an-open-letter-to-microsoft-dont-bid-on-the-us-military-s-project-jedi-7279338b7132>  
Will Knight, "Why AI Researchers Shouldn't Turn Their Backs on the Military," *MIT Technology Review* August 14, 2018.

**April 26, 8pm: Governance Recommendation Due!**