Spring 2020

Harvard University
Mondays and Wednesdays, 3:00-4:15 PM
ROOM CHANGE: B150, [Northwest Building](#), 52 Oxford St

In an era of unprecedented technological change, informed citizens will need to make sense of rapidly evolving societal challenges. In this course, students will examine real-life cases in areas like genetic engineering, artificial intelligence, environmental justice, and climate change. Readings, lectures, and discussions will explore issues such as how technology should be regulated, how individual and societal values should be weighed against each other, and how risk-benefit analysis should be applied. The course will aim to give students of any concentration the conceptual tools and structure to grapple with the diverse responsibilities, rights, and privileges of the 21st century citizen.

Instructors

- Sheila Jasanoff, Pforzheimer Professor of Science and Technology Studies, Harvard Kennedy School
- L. Mahadevan, Lola England de Valpine Professor of Applied Mathematics, Professor of Organismic and Evolutionary Biology, and Professor of Physics
- Keith Raffel, Internet entrepreneur, author, resident scholar in Mather House, lecturer
- Christopher Lawrence, Teaching fellow, Harvard Kennedy School of Government
- Sam Weiss Evans, Lecturer, Paulson School of Engineering and Applied Sciences

Office Hours

Sheila Jasanoff, L. Mahadevan, and Keith Raffel: By Appointment

Sam Weiss Evans:

- Mondays 2:15-2:45pm Clover coffee counter inside the Science Library in the Science Center
- Wednesdays after class wherever we can find a seat

Chris Lawrence:

- Mondays 4:30-6pm
- or by appointment

Course Logistics

Course activity: â€œbreaking open the black boxâ€

Students analyze a scientific or technical issue of their choice to answer questions such as: How does the issue reinforce or challenge pre-existing societal norms? How is it situated within a fabric of social identities, values, and power structures that make up society as we know it? What alternative configurations could have arisen, and what risks/opportunities do the chosen configurations present for human (or ecological) welfare?

During the early weeks of the course, these exercises are led by instructors and carried out together in class on pre-selected topics. Later, students will be paired (ideally one STEM and one non-STEM concentrator in each group) and assigned a 30-minute slot to lead their classmates through a discussion of their chosen topic.

Theoretical tools: the â€œSTS Crib Sheetâ€

This course serves as an introduction to the discipline of Science, Technology and Society, often referred to as Science and Technology Studies (handily, both acronyms are STS). Rather than assigning large amounts of theoretical reading, students accumulate a list of concepts as the course proceeds, and draw from that list as they weigh various technical/scientific/political issues. This list is not intended as a comprehensive guide to any particular field, but rather as an entry point to political engagement with science and technology. All of the concepts are introduced in the first week of the class, and following weeks feature one or two concepts for deeper engagement and academic reading.

[Download the STS Crib Sheet](#)

Course Structure

Class meets Mondays and Wednesdays, 3-4:15pm. Mondays usually feature a short conceptual lecture (30-45 min) and class discussion; Wednesdays will cover a â€œblack boxâ€ case study, sometimes involving a guest experts (30 min) followed by class discussion. The semester is broken into three modules covering biotechnology, information technology and environmental technology. Each module will comprise three weeks. Additional weeks will be filled with student presentations.

Course Assignments

Readings: A mix of theoretical and case-study reading are assigned each week (~70 pages/week). Readings are subject to change so be sure to look at the canvas site for the most current syllabus.

Weekly reading responses: students will be required to complete two short reading responses during each module (total six responses, 350 words maximum each). These will be due Tuesdays at 5pm, and reading questions will be posted one week prior to due date to guide reading and responses.

Advocacy writing assignment â€" (Weeks 6-8): You are to write a 750-1000 advocacy piece that address a topic from one of the modules for the course. Your writing will then be subject to peer review, and you will submit a revised version after Spring Break. More information is on [the Assignments page](#).

NOTE: this assignment and the final black box exercise are the two biggest parts of your grade. Each assignment topic needs to be from a different module. So, for example, if your advocacy piece is from the Information Technology module, your blackbox exercise needs to be from the Environmental or Biotechnology modules.

â€œBreaking open the black boxâ€ term project (students choose slots of class time): Students are paired and choose an issue to examine in line with the black box exercises done throughout the course. A primary function of this exercise is to give students the opportunity to combine technical and humanistic analysis. Pairs are required to have an in-class presentation (~15 minutes) and a written paper (of 3000-4000 words), which may be accompanied by other material such as a YouTube explainer or website designed to engage diverse audiences on chosen topic.

Note: Students should focus on different modules for their advocacy assignments and their term projects.

Grade Weighting

- Weekly Assignments: 15%
  - 2 of 3 responses per module. If you score at least a 2, you will get full credit. A 3 represents exceptional work. Your lowest score for each module will be dropped.
- Advocacy Writing: 25%
- Peer Review of Advocacy Writing: 10%
- Final Black Box Exercise: 35%
- Class Participation: 15%

Weekly Schedule

Week 1: Introduction to the course

Readings (26 pages):

- Joy, Bill. â€œ[Why the Future Doesnâ€™t Need Us](#).â€ Wired, April 1, 2000. (16 pages).
- STS Crib Sheet (10 pages).

Monday (1/27): Introductions and course outline

Wednesday (1/29): Introduction to the STS Crib Sheet

Module 1: Biotechnology at the Frontiers

Week 2: Drawing the boundaries of moral beings

Featured concept(s): framing and incommensurability

Readings (44 pages):

- Sheila Jasanoff (2019), *Can Science Make Sense of Life*, ch. 1, "A New Lens on Life." (24 pages)
- Donald Schon et al. (1994), *Frame Reflection: Toward the Resolution of Intractable Policy Controversies*, ch. 2, "Policy Controversies as Frame Conflicts." (20 pages)
- Podcast (2019): "Splice of Life," on Christopher Lydon (host), Open Source.

Monday (2/3): Introduction to the biotech module

Wednesday (2/5): Breaking open the black box — Is mental illness located in the brain?

Week 3: Who should design the future human?

Featured concept(s): boundary work, mapping of natural objects and moral responsibility

Readings (71 pages):

- Sheila Jasanoff (2018), *The Ethics of Invention*, ch. 5, "Tinkering with Humans." (30 pages)
- Jasanoff S, Saha K and Hurlbut JB (2020) Should We Alter the Human Genome? Let Democracy Decide. *Scientific American Blog Network*. (accessed 27 January 2020).
  Wee S-L (2019) Chinese Scientist Who Genetically Edited Babies Gets 3 Years in Prison. The New York Times, 30 December. (accessed 27 January 2020).
- Thomas Gieryn (1995), "Boundaries of Science," in Handbook of STS, selected excerpts (Pages 339 - 407 (3-17 of PDF) and 424 - 441 (34 - 51 of PDF))

Monday (2/10): Conceptual lecture: boundary work

Wednesday (2/12): Breaking open the black box: Editing the human genome and the embryo as moral/societal boundary

Week 4: Public engagement with science

Featured concept(s): interpretive flexibility, models for public engagement with science

Readings (46 pages):

- Michael Specter (2017), "Rewriting the Code of Life," *The New Yorker*. (23 pages)
- Doubleday R and Wynne B (2011) Despotism and Democracy in the United Kingdom: Experiments in Reframing Citizenship. In: Jasanoff S (ed.) *Reframing Rights: Bioconstitutionalism in the Genetic Age*. MIT Press, pp. 239–262.
- Sheila Jasanoff and Benjamin Hurlbut (2018), "A Global Observatory for Gene Editing," *Nature*. (5 pages).

Monday (2/17): NO LECTURE (Presidents Day)

Wednesday (2/19): Breaking open the black box — Gene-drive technology and remaking natural/public spaces

Module 2: Information Technology: Privacy, Fairness, and Democracy

Week 5: Surveillance and privacy

Featured concept(s): panopticism, comparative politics

Readings (PDFs of readings are in the files section) (79 pages + 5-minutes listening):

- Gary Gutting (2005), Foucault: A Very Short Introduction, excerpt from ch. 8 "Crime and Punishment." (3 pages).
- Maggie Koerth-Baker (2018), "Science Wants Your Data," FiveThirtyEight. (3 pages)
- Peter Waldman et al. (2018), "Palantir Knows Everything About You," Bloomberg. (7 pages)
- Paul Mozur (2018), "Inside China's Dystopian Dreams: AI, Shame and Lots of Cameras," New York Times. (5 pages)
- "Doorbell-camera firm Ring has partnered with 400 police forces, extending surveillance concerns," Washington Post, August 28, 2019 (6 pages)
- "Colleges are turning phones into surveillance machines, Washington Post, December 24, 2019 (16

pages)
- "Jerry Westrom Threw Away a Napkin Last Month. It Was Used to Charge Him in a 1993 Murder," New York Times, February 17, 2019 (3 pages)
- "Privacy and DNA Tests," NPR Radio, November 9, 2019 (5 minute listen)
- "FBI, ICE find state driver's license photos are a gold mine for facial-recognition searches," Washington Post, July 7, 2019 (6 pages)
- "Apple Escalates War Against Facebook and Its Privacy Practices," Washington Post, January 30, 2019 (4 pages)
- "It's the Middle of the Night. Do You Know Who Your iPhone Is Talking to?" Washington Post, May 28, 2019 (4 pages)
- "The Government Protects Our Food and Cars. Why Not Our Data?" New York Times, November 2, 2019. (4 pages)
- "Tech Giants' New Appeal to Government: Please Regulate Us," Wall Street Journal, February 13, 2020 (3 pages)
- "CCPA FAQ: A Citizen's Guide for America's First Privacy Law," Washington Post, February 12, 2020 (10 pages)
- "The Protest" by Alex Berenson, New York Times (5 pages)

Monday (2/24): Lecture: Surveillance, privacy and applications of big-data technologies.

Wednesday (2/26): Breaking open the black box — Comparing framings and governance of surveillance, privacy and citizenship in the U.S. and China

Week 6: Big data, machine learning and "fairness"

Featured concept(s): representative versus performative knowledge.

Readings (PDFs of all readings are in the files section)

(79 pages + optional 50 minutes listening):

- Cathy O'Neil (2016), Weapons of Math Destruction, ch. 1, "Bomb Parts: What is a Model?" (15 pages).
- Kleinberg, Ludwig, Mullainathan. (2016), "A Guide to Solving Social Problems with Machine Learning," Harvard Business Review. (9 pages)
- John Cheney-Lippold (2017), We Are Data: Algorithms and the Meaning of Our Digital Selves, ch. 1, "Categorization: Making Data Useful" (pp. 37-67)
- Will Knight (2017), "The Dark Secret at the Heart of AI," MIT Technology Review (7 pages)
- We Teach A.I. Systems Everything, Including Our Biases, New York Times, November 11, 2019 (2 pages).
- NIST Study Evaluates Effects of Race, Age, Sex on Sex Recognition Software, NIST Press Release, December 19, 2019 (5 pages)
- Kim Thomas, "AI Doctors Have A Trust Problem," OneZero, November 15, 2019 (5 pages)
- Caliskan, Bryson, Narayanan, "Semantics derived automatically from language corpora contain human-like biases," Science, April 14, 2016 (4 pages)
- OPTIONAL: "Can Algorithms Be Trusted?" The Real Story, BBC Podcast, November 22, 2019 (50 minutes)

Monday (3/2): Lecture: Algorithmic fairness, opacity of machine learning.

Wednesday (3/4): Breaking open the black box — artificial neural networks, criminal law, and performativity of data and optimization.

Week 7: Social networking, fake news, and democracy

Featured concept(s): construction of subjects and publics

Readings

(PDFs of most readings are in the files section; two online readings and one online video are marked "use link" below.)

(82 pages + 5 minutes watching):

- Zucked by Roger McNamee, Chapter 4, pp. 81-110, (29 pages)
- The Senate Select Committee on Intelligence Report on Russian Active Measures, Campaigns and Interference in the 2016 U.S. Election; volume 2, [Russia’s Use of Social Media](#) , pp11-24 (USE LINK)
- “How Facebook’s Embed in the Trump Campaign Helped the President Win,” [Wall St. Journal](#), November 23, 2019 (7 pages)
- “I worked on political ads at Facebook. They profit by manipulating us.” [Washington Post](#), November 4, 2019 (10 pages)
- “Rep. Ocasio-Cortez questions Mark Zuckerberg on when Facebook will fact check,” PBS, October 24, 2019 ([YouTube video](#)) (5 minutes) (USE LINK)
- “Facebook shouldn’t run Trump’s lie-laden ads,” [Washington Post](#), October 26, 2019 (6 pages)
- Angela Chen, “Why Facebook is right not to take down the doctored Pelosi video,” [MIT Technology Review](#), May 28, 2019 (2 pages)
- “What Ads Are Political? Twitter Struggles With a Definition,” [New York Times](#), November 5, 2019 (2 pages)
- Disinformation and the 2020 Election, [NYU Center for Business and Human Rights](#), September 2018, pp 17-20 (4 pages) (USE LINK)
- "Facebook disables Russian and Iranian efforts to manipulate users," [Washington Post](#), February 12, 2020 (4 pages)
- In U.S. Most Oppose Micro-targeting in Online Political Ads, [Knight Foundation](#), March 2, 2020 (4 pages)

Optional:

- Netflix Documentary: “The Great Hack” (114 minutes)

Monday (3/9): Lecture

Wednesday (3/11): Breaking open the black box — 2020 Election

SPRING BREAK

Module 3: Global Environment, Inequality and Collective Action

Week 8: Tragedy of the commons

Featured concept(s): tragedy of the commons, inter-temporal welfare, the anthropocene, politics of numbers

Readings (42+ pages):

- Garrett Hardin (1968), “[Tragedy of the Commons](#),” Science. (5 pages).
- Stephen M. Gardiner (2006), “[A Perfect Moral Storm: Climate Change, Intergenerational Ethics and the Problem of Moral Corruption](#),” Environmental Values, 15: 397–413. (11 pages)
- Kenneth Arrow et al. (2004), “[Are We Consuming Too Much](#)?” Journal of Economic Perspectives. (22 pages).
- Herman Daly et al. (2007), “[Are We Consuming Too Much? For What?](#)” Conservation Biology. (4 pages)

Monday (3/23): Introduction to environment module; “tragedy of the commons”

Wednesday (3/25): Breaking open the black box — Writing down an equation to optimize and distribute “welfare”?

Week 9: Eco Systems, Complexity and Catastrophic Risk

Featured concept(s): fat tails, tipping points, non-linear systems, the precautionary principle

Readings (50 pages):

- Jon Butterworth, “[Belief, Bias and Bayes](#),” The Guardian. (3 pages)
- Nasim Taleb et al. (2014), “[The Precautionary Principle (with Application to Genetic Modification of Organisms](#)),” Extreme Risk Initiative, NYU School of Engineering Working Paper Series. (skipping

appendix, 14 pages).

- James Gleick, [Chaos: Making a New Science](), ch. 2, "The Butterfly Effect." (21 pages).
- Gerard Roe (2007), "[Why is Climate Change Sensitivity So Unpredictable]()," Science. (4 pages)
- Mahadevan Notes — based on L Mahadevan and J Deutch (2010) "Influence of feedback on the stochastic evolution of simple climate systems" Proc. R. Soc. A, 466, 993-1003 — fat tails and dynamics (only conceptual part needs to be emphasized)
- Scheffer et al. (2012) "[Anticipating critical transitions]()," Science. (4 pages).

Monday (3/30): Random-walk derivation of the normal distribution. Also a derivation of fat tails, and introduction to extreme value statistics. Critical transitions.

Wednesday (4/1): Breaking open the black box — Anticipating critical transitions in climate

Week 10: Social cost of climate change sustainability, and managing the commons

Featured concept(s): Vulnerability versus risk, distributive justice, collective action.

Readings:

- Rayner, Steve, and Elizabeth L. Malone. 1997. "Zen and the Art of Climate Maintenance." Nature 390 (6658): 332.
- William Nordhaus (2017), "Revisiting the Social Cost of Carbon," PNAS.
- David Leonhardt (2019), "The Problem with Putting a Cost on the End of the World."
- Daniel Sarewitz (2004), "How Science Makes Environmental Controversies Worse," Environmental Science and Policy.
- D. Spiegelhalter et al, Nature, 2013.
- E. Ostrom (2014), A polycentric approach for coping with climate change.

Monday (4/6): Social construction of risk and wicked problems

Wednesday (4/8): Breaking open the black box - TBD

Week 11: COVID week

Monday (4/13): TBD

Wednesday (4/15): TBD

Week 12: TBD

Reading Week/Exam period: Black box presentations