# Science and Power: Who Rules Science?

Instructor: June Jeon
MW: 1:30 PM – 2:45 PM (EST)
Office Hour: 2:45 PM – 3:45 PM (Wed)
Meetings at Zoom
(https://tufts.zoom.us/j/2314438903)

**Introduction**

Science and power look like they belong in different worlds—science in the world of truth, objectivity, and curiosity, and power in the world of politics, competition, coercion, and oppression. This class aims to dismantle such distinctions and to reconceptualize science as a fundamentally social practice, embedded within the power structure of our society. What is science? How does power operate in shaping scientific knowledge and technological artifacts? How does knowledge and technological artifacts shape our society? What are some implications of the co-constructive dynamics between science and society? What are some pragmatic solutions to resolve real-world problems at the intersection of science and society? By raising and addressing these questions, we will critically reflect upon the role of science and civil society in building our democratic, just, and sustainable future.

**Readings (selected)**

Most of readings will be uploaded in Canvas. You are not asked to purchase any textbook for this class.

1. Important textbooks:

Frickel S and Moore K (2006) *The new political sociology of science : institutions, networks, and power*. University of Wisconsin Press.

Jasanoff S (2004) *States of knowledge: the co-production of science and the social order*. Routledge.

Kleinman D and Moore K (eds) (2014) *Routledge Handbook of Science, Technology, and Society*. *Routledge Handbook of Science, Technology, and Society*. Routledge. DOI: 10.4324/9780203101827.

Sismondo S (2010) *An introduction to science and technology studies*. Wiley-Blackwell Chichester.

2. Natural science materials:

Crutzen PJ (2002) Geology of mankind. *Nature* 415(6867). Nature Publishing Group: 23–23. DOI: 10.1038/415023a.

Doudna JA and Charpentier E (2014) The new frontier of genome engineering with CRISPR-Cas9. *Science* 346(6213): 1258096. DOI: 10.1126/science.1258096.

Platto, S., Xue, T. & Carafoli, E. (2020) COVID19: an announced pandemic. *Cell Death Dis* **11,** 799. https://doi.org/10.1038/s41419-020-02995-9

Ponce, D. (2020). The impact of coronavirus in Brazil: politics and the pandemic. *Nature Reviews Nephrology*, *16*(9), 483-483.

Ricigliano, V.A., Mott, B.M., Floyd, A.S. *et al.* (2018) Honey bees overwintering in a southern climate: longitudinal effects of nutrition and queen age on colony-level molecular physiology and performance. *Sci Rep* **8,** 10475 https://doi.org/10.1038/s41598-018-28732-z

U.S. EPA. Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-16/236F, 2016. (Available at https://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=332990)

3. Social science materials:

Ashwood L, Harden N, Bell MM, et al. (2014) Linked and Situated: Grounded Knowledge. *Rural Sociology* 79(4). John Wiley & Sons, Ltd: 427–452.

Beck U (1992) *Risk society : towards a new modernity*. Sage Publications. (selected pages)

Brown P, Morello-Frosch R and Zavestoski S (2011) *Contested illnesses: Citizens, science, and health social movements*. Univ of California Press.

Haraway D (1988) "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." *Feminist Studies*, 575-599

Kimura and Kinchy (2016) Citizen Science: Probing the Virtues and Contexts of Participatory Research. *Engaging Science, Technology, and Society* 2: 331-361

Kloppenburg J (1991) "Social Theory and the De/Reconstruction of Agricultural Science." *Rural Sociology*. 519-548

Moore K, Kleinman D, Hess D, et al. (2011) Science and neoliberal globalization: A political sociological approach. *Theory and Society* 40(5): 505–532.

Murphy M (2017) Alterlife and decolonial chemical relations. *Cultural Anthropology* 32(4): 494–503.

Oreskes N and Conway EM (2010) *Merchants of doubt : how a handful of scientists obscured the truth on issues from tobacco smoke to global warming*. Bloomsbury Press. (selected chapters)

Suryanarayanan S and Kleinman D (2016) *Vanishing bees : science, politics, and honeybee health*. Rutgers University Press (selected chapters)

**Thematic Outline**

What is Science? What is Technology? (Case: Natural scientific views on Anthropocene)

Descriptive and Normative Theories of STEM

De-mystifying Observation and Experimentation

Evidence and Arguments that Count

Design and Values in Technology (Case: COVID-19 and technologies for masks)

Can STEM be political? (Case: CRISPR-cas9 technology)

Feminist Questions in Science (Case: Honey bee hive Collapse Disorder)

Stratification and Discrimination

Risk, Science, and Technology (Case: Hydraulic Fracking and the EPA's scientific reports)

Social Movements for and against Science

Citizen Science and Public Engagement

Social Conflicts and Scientific Conflicts, Scientific Conflicts as Social Conflicts

**Assignments and Grading**

1. Students will write weekly reading reflections (2 pages double space per week): 40%

: Beginning from the Week 2, students should submit their reading responses to **Canvas** page. Due date is every Sunday night (23:59 pm). Your reading response should 1) adequately summarize major arguments/evidences of the assigned reading material(s) of the week, 2) present your interpretation on them. Students should write at least one reply to another students' reading reflection every week. There is no due date for this 'engagement' activity.

: You are expected to write only **8 reading reflections (5 * 8 = 40%)** throughout the semester. This means that you can skip several weeks, based on your own schedule. There will be no bonus score even if you write more than eight reflections.

2. There will be both midterm and final exams (15 * 2 = 30%)

: Exams will be take home & essay exams. More details will be announced during the class meeting.

3. There is one final paper (20%)

: Students have full autonomy regarding which topic / type / length of paper they would like to write for this class. For instance, one can create a YouTube video for their final project or conduct interviews with people, etc. Please consult me regarding your final project.

4. Participation (10%)

: This class needs your active participation for a discussion. This doesn't mean that you should be talkative all the time. I expect to hear some 'meaningful' participations from you. For this meaningful participation, it would be crucial to finish the assigned readings before you come to the class. Especially, Wednesday classes will be more discussion-oriented than Monday classes. Your participation score (10%) seems like a minimal portion toward your final grade; however, it will add some 'qualitative' evaluation in finalizing your final grade. For instance, if I feel like you were a great student in a classroom, I have a full autonomy to upgrade your letter grade at the end of the semester. More than that, if you are not going to have fun in this class by interacting with others, then what is the point of taking this class after all? ☺

5. Bonus assignment (??%)

: There will be 'several' pop-up assignments throughout the semester. They will be very easy assignment, mostly a think piece that you can simply write and share with others in Canvas.

**Modality: Online and (hopefully) In-person (TBD)**

**Office hour (at my Zoom)**

**Wednesday 2:45pm – 3:45 pm (1 hour after the class meeting on Wednesday)**

**If this schedule does not work, please always feel free to email me.**

**Course Schedule**

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| **Week 1** | **What is science? Why do we have to think about science sociologically? What do we mean by that?**<br><br>**https://www.nature.com/articles/d41586-021-00159-z**<br><br>**2/1 – Introduction to the course**<br><br>**2/3 – Thinking natural science through social science** |

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| **Week 2** | **Setting the stage – Science and Technology Studies**<br><br>Kleinman D and Moore K (eds) (2014) – Introduction (only 1-7 pp.)<br>Sismondo S (2010) – chapter 1 (1-11 pp.)<br><br>**2/8 – What is science? What is technology? I**<br><br>**2/10 – What is science? What is technology? II**<br><br>**Bonus assignment – Sociological Imagination & Science/Technology** |
| **Week 3** | **Intersection of our own life history – social contexts – science/technology**<br><br>**(no assigned readings / no reading reflections)**<br><br>**2/15 – Essay presentation 1 (5 mins presentation per each)**<br><br>**2/17 – Essay presentation 2 (5 mins presentation per each)** |
| **Week 4** | **Objectivity and Power**<br><br>Frickel S and Moore K (2006) – chapter 11 "Powered by the people"<br><br>U.S. EPA. Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-16/236F, 2016. (Available at https://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=332990)<br><br>Plus, do your own research on environmental controversies around hydraulic fracking (Good documentary film, entitled *Gasland* is widely available)<br><br>**Additional useful resource:**<br><br>Panofsky A and Bliss C (2017) Ambiguity and Scientific Authority. *American Sociological Review*: 000312241668581. DOI: 10.1177/0003122416685812.<br><br>**2/22 – Opening the Black Box: Demystification of science (What do we mean by 'objective' science? Is science less objective when it becomes more inclusive?)**<br><br>**2/24 – Is science less objective when it becomes more inclusive? – Case of hydraulic fracking** |
| **Week 5** | **Which science de we need? Science, a voice and tool for whom?** |

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| | Frickel S, Gibbon S, Howard J, et al. (2010) Undone Science: Charting Social Movement and Civil Society Challenges to Research Agenda Setting. *Science, Technology & Human Values* 35(4): 444–473.<br><br>Frickel S and Vincent MB (2007) Hurricane Katrina, contamination, and the unintended organization of ignorance. *Technology in Society* 29(2): 181–188.<br><br>**3/1 – Undone science: how social inequality and science meet I**<br><br>**3/3 – Undone science: how social inequality and science meet II** |
| **Week 6** | **Feminism and Science/Technology – beyond gender studies**<br><br>Sismondo S (2010) – chapter 7 "Feminist Epistemologies of Science"<br><br>Suryanarayanan S and Kleinman DL (2013) Be(e)coming experts: The controversy over insecticides in the honey bee colony collapse disorder. *Social Studies of Science* 43(2). SAGE Publications Ltd: 215–240. DOI: 10.1177/0306312712466186.<br><br>Kloppenburg J (1991) Social theory and the de/reconstruction of agricultural science: local knowledge for an alternative agriculture 1. *Rural sociology* 56(4). Wiley Online Library: 519–548.<br><br>**3/8 – Feminist Question in Science**<br><br>**3/10 – Case study: Honey Bee Colony Collapse Disorder and Knowledge Producers' Social/Cultural Positionalities** |
| **Week 7** | **3/15 – Midterm exam**<br><br>**3/17 – Meetings for your final project (recommended)** |
| **Week 8** | **Race and Science – how do racial inequality and scientific inequality amplify each other?**<br><br>Kleinman D and Moore K (eds) (2014) – Chapter 2 "Technoscience, Racism, and the Metabolic Syndrome" |

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| | Nelson A (2008) Bio Science: Genetic Genealogy Testing and the Pursuit of African Ancestry. *Social Studies of Science* 38(5). SAGE Publications Ltd: 759–783. DOI: 10.1177/0306312708091929.<br><br>**3/22 – Race and Science (Science about Race)**<br><br>**3/24 – Race and Science (Science for racialized communities)** |
| **Week 9** | **Science and Organization – How are scientific practices 'social'?**<br><br>Sismondo S (2010) – chapter 17 "Political economies of knowledge"<br><br>Kleinman D (1998) Untangling Context: Understanding a University Laboratory in the Commercial World. *Science, Technology, & Human Values* 23(3): 285–314.<br><br>**3/29 – Thinking through organization – what does it mean?**<br><br>**3/31 – University-based science, is it pure?** |
| **Week 10** | **Science and Organization II**<br><br>Frickel S and Moore K (2006) – chapter 3 "Commercial Imbroglios: Propriety Science and Contemporary University<br><br>Doudna JA and Charpentier E (2014) The new frontier of genome engineering with CRISPR-Cas9. *Science* 346(6213): 1258096. DOI: 10.1126/science.1258096.<br><br>Brinegar K, K. Yetisen A, Choi S, et al. (2017) The commercialization of genome-editing technologies. *Critical Reviews in Biotechnology* 37(7). Taylor & Francis: 924–932. DOI: 10.1080/07388551.2016.1271768.<br><br>**4/5 – Commercialization of Science and Technology**<br><br>**4/7 – Case study – Gene editing techs, such as CRISPR-cas9** |
| **Week 11** | **Science and Natural Environment**<br><br>Crutzen PJ (2002) Geology of mankind. *Nature* 415(6867). Nature Publishing Group: 23–23. DOI: 10.1038/415023a. |

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| | Oreskes N and Conway EM (2010) *Merchants of doubt : how a handful of scientists obscured the truth on issues from tobacco smoke to global warming*. Bloomsbury Press. (OR, you can watch the documentary film with the same title!)<br><br>Kleinman D and Moore K (eds) (2014) – chapter 20 "Invisible Production and the Production of Invisibility"<br><br>Useful resources:<br><br>Steffen W, Grinevald J, Crutzen P, et al. (2011) The Anthropocene: conceptual and historical perspectives. *Philosophical Transactions Of The Royal Society A-Mathematical Physical And*. DOI: 10.1098/rsta.2010.0327.<br><br>Kahan DM, Braman D, Gastil J, et al. (2007) Culture and identity-protective cognition: Explaining the white-male effect in risk perception. *Journal of Empirical Legal Studies* 4(3). Wiley Online Library: 465–505.<br><br>McCright AM and Dunlap RE (2011) The Politicization of Climate Change and Polarization in the American Public's Views of Global Warming, 2001-2010. *Sociological Quarterly* 52(2). Wiley-Blackwell: 155–194. (SKIM)<br><br>**4/12 – Anthropocene**<br><br>**4/14 – Environmental non-problematization (Case of climate change denialism)** |
| **Week 12** | **Science and Health – Why some are sicker than others?**<br><br>Nelson A (2011) *Body and soul: The Black Panther Party and the fight against medical discrimination*. U of Minnesota Press. – Conclusion (especially from p. 183)<br><br>Bambra C, Riordan R, Ford J, et al. (2020) The COVID-19 pandemic and health inequalities. *J Epidemiol Community Health* 74(11). BMJ Publishing Group Ltd: 964–968.<br><br>**One more up-to-date material will be added (TBD)**<br><br>**4/19 – Social Determination of Health – STS' view**<br><br>**4/21 – Social Determination of Health – STS' view** |

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| **Week 13** | **Science of/by/for the people – Science and Democracy**<br><br>"No PhD needed" https://www.nature.com/articles/d41586-018-07106-5<br><br>Sismondo (2010) – Chapter 15 "The Public Understanding of Science"<br><br>Jasanoff (2004) – chapter 1 and 2 (VERY difficult!)<br><br>**4/26 – Science and Democracy – Co-production of knowledge and power**<br><br>**4/28 – Co-production of knowledge and power (continued)** |
| **Week 14** | **Science of/by/for the people**<br><br>Sismondo S (2010) – Chapter 16 "Expertise and Public Participation"<br><br>Kimura and Kinchy (2016) Citizen Science: Probing the Virtues and Contexts of Participatory Research. *Engaging Science, Technology, and Society* 2: 331-361<br><br>Epstein S (1995) The construction of lay expertise: AIDS activism and the forging of credibility in the reform of clinical trials. *Science, Technology & Human Values* 20(4). Sage Publications: 408–437.<br><br>**5/3 – Social Conflicts and Scientific Conflicts, Scientific Conflicts as Social Conflicts**<br><br>**5/5 – CODA: Where are we going?** |
| **Final Exam** | **Sometime**<br><br>**Final paper due date (TBD)** |