

Expertise, Engineering, and Environments

*this syllabus is based on “Engineering, Society, and Environment”, designed and taught by Dr. Khalid Kadir

Lower Division Course
Ashton Wesner
Email: ashton.wesner@berkeley.edu

OVERVIEW

The work of engineers shapes nearly every aspect of modern society as we know it and while engineers have positively shaped the quality of life for countless people since the industrial revolution, not all engineering projects and innovations have benefit everyone equally. Engineering expertise does not exist outside of politics, nor does it exist apart from social inequalities: In fact, it is deeply shaped by them and in turn produces them. This course will examine how the field of engineering has come to be what we know today, investigate how real-world engineering solutions sometimes do more harm than good, and collaborate on hands-on community-designed projects that aim to transform the politics of engineering.

What does it mean to analyze engineering as a social, cultural, and political set of practices? As engineers of tomorrow innovate new approaches to tackle intractable inequalities, what do they need to know about the histories of the problems and people they are working with? In “Engineering, Expertise, and Environments” we will hone in on environmental inequality to consider how future engineers might engage with communities to address environmental pollution, degradation, and even social oppression.

COURSE CONTENT

Not all communities are exposed to environmental hazards in the same way: When some communities bear a disproportionate burden of environmental harm—from toxic dumping, mine effluents, nuclear waste processing, or highway particulates to name a few—it is the result not just of geography or infrastructure, but the relationship between the built environment and complex social and political processes. Processes which have involved engineers at crucial junctures. As engineers train to engage with environmental impact statements, issue air quality regulations and permits, and design water quality standards to manage drinking water, they must understand the social context and consequences of their work. Clearly, in addition to scientific, physical, and chemical problem solving, communities’ health and well-being are also at stake.

The primary purpose of this course is to assist future engineers in their training to be civically engaged, social justice minded, and environmentally oriented. As such, we will learn how to look beyond the technical orientation of environmental engineering and recognize the ways in which problems that are commonly defined in technical terms are at their roots deeply socially embedded. Students will study the intersections of engineering, environmental justice, and

critical social theory. Upon learning to recognize the socio-political nature of problems, students will be prepared to approach solutions in ways that prioritize social justice with an understanding of both the limitations and possibilities of technically-based engineering solutions. In so doing, students will cover topics such as environmental racism; privilege and positionality; ethics; expertise; community engagement; race, class, and gender; colonialism and development; the politics of knowledge production.

A key component of this course is also to understand how different kinds of knowledge come to matter when tackling engineering problems, with what consequences, and for whom. Students may have the opportunity to work with local community partners on research and engineering projects that push the bounds of traditional technical methods of problem identification and solution development. Context, community knowledge and history, and social relationships and collaborations will be brought to the fore: Students will learn to value different forms of knowledge produced within the communities that are directly impacted daily by environmental degradation.

OBJECTIVES

Understand how the technical work of engineers is inherently social and political

Synthesize key theoretical approaches to analyzing expertise, science, and engineering, and social structures (such as race, class, and gender)

Demonstrate proficiency in evaluating the relationship between environmental engineering projects and the social, cultural, and political conditions of the communities affected by those projects

Demonstrate historical and contemporary knowledge of environmental justice organizing and knowledge (e.g. how African American, Latino, Asian American, and Native American communities tackle the environmental hazards facing their communities)

Cultivate a practice of self-reflexivity: Evaluate personal ethical positions as they prepare for careers in which their projects and decisions will affect historically marginalized communities

ASSIGNMENTS AND GRADING

Grading will be relative to where you are when you begin the course. Successful progress toward the degree always requires both insight and effort, but the proportions vary from student to student. Following are rough proportions for each area of activity, to help you apportion your efforts:

35% Class participation and Attendance

15% Discussion Lead and Reading Response

Sign up to pose discussion questions and present cultural texts (photos, images, poem, activist print, etc.) based on your two page reading responses to the class.

No more than two people per week for weeks 2-9.

15% Reading Responses

Select 5 additional weeks for which to write a reading response to share with your classmates by Monday before seminar. Write no more than 1 page, with 1.15 spacing, 12 point font, and decent tabs. Provide a paragraph summarizing the main claims and arguments of all the authors read for that week, each in relation to the others. Provide a second or third paragraph that assesses the authors' positions, their use of evidence to make their points, and their arguments in relation to one another, their empirical material, and/or the current or previous ideas covered in class.

35% Final Paper or Community Project (Due by 3:00 PM March 24)

Your final paper (3500-4000 words) will require you to deconstruct an engineering project that was completed within the past 20 years. In the paper you will begin by analyzing the technical components of the project and describing the problem definition as it was understood by the engineers. Following the technical analysis, you will be asked to step back and evaluate the larger context in which this technical intervention took place, and to consider the social, political, and cultural implications of the project. You will be required to submit numerous small assignments leading up to the final paper, giving your GSI a chance to provide you with feedback that you can incorporate into your final product. A detailed description of the paper topic will be provided.

ACCESS/ACCESSIBILITY

I am committed to making success in my classes possible for all students. On the first day of class we will establish a Community Agreement about how to be accountable to one another – respectful, participatory, generous and empowering – that we can refer to throughout the semester. If at any point in the semester you find that success is a challenge for you—because of my teaching style, the arrangement of the class, life constraints, technology issues, or a disability—please talk to me. Berkeley's policy on accessibility is that accessibility-related accommodations are required by law, and resources for ensuring access can be found at <https://dsp.berkeley.edu/>; 260 César E. Chávez Student Center #4250; and you can email dsp@berkeley.edu.

Examples of Past Community Partners:

Asian Pacific Environmental Network (APEN) (apen4ej.org)

APEN brings together a collective voice to develop an alternative agenda for environmental, social, and economic justice. Through building an organized movement, they strive to bring fundamental changes to economic and social institutions that will prioritize public good over profits and promote the right of every person to a decent, safe, affordable quality of life, and the right to participate in decisions affecting our lives.

Communities for a Better Environment (CBE) (cbecal.org)

The mission of CBE is to build people's power in California's communities of color and low income communities to achieve environmental health and justice by preventing and reducing pollution and building green, healthy and sustainable communities and environments. CBE provides residents in blighted and heavily polluted urban communities

in California with organizing skills, leadership training and legal, scientific and technical assistance, so that they can successfully confront threats to their health and well-being.

Energy Solidarity Co-op (ESC) (esc.coop)

ESC, currently based in Oakland, CA, is a cooperative comprised of worker members, consumer members, and sustainers that work on community solar projects in disenfranchised and low-income areas of California. ESC democratizes financing and ownership of renewable energy through partnerships with the communities in which they work. These partnerships seek to empower communities through a localized governance approach that combines member equity, community investment, and knowledge transfer services to spread community-led clean power projects. ESC is working to make it possible for community residents to share in the direct economic, social, and environmental benefits of local, suitable solar sites.

Sierra Club San Francisco Bay Chapter (sanfranciscobay.sierraclub.org)

Through advocacy, outreach, and political organizing, the Sierra Club San Francisco Bay Chapter works to cut Bay Area emissions of greenhouse gases and protect the air that people breathe, among other goals. Recently, the Sierra Club San Francisco Bay Chapter had a major success in implementing a refinery emissions tracking rule, which mandates a yearly update from the refineries in Contra Costa County about what kinds of crude they're using, sets emissions caps, and makes refineries reduce their emissions 20% by the year 2020.

The Watershed Project (TWP) (thewatershedproject.org)

Through a mix of education, community organizing, and restoration projects, The Watershed Project is dedicated to the restoration and preservation of the unique urban watersheds that make up the San Francisco Bay Area. Their Greening Urban Watersheds Initiative helps communities protect local watersheds through strategies including bioswales, rain gardens, and low impact design projects. This initiative works in predominantly African American and Latino neighborhoods in Richmond, CA that have been historically underfunded and whose stormwater infrastructure is currently subject to urban neglect.

West Oakland Environmental Indicators Project (WOEIP) (woeip.org)

The West Oakland Environmental Indicators Project (WOEIP) is a non-profit organization located in West Oakland, California. WOEIP is a resident led, community-based environmental justice organization dedicated to achieving healthy homes, healthy jobs and healthy neighborhoods for all who live, work, learn and play in West Oakland. WOEIP's mission is to build grassroots capacity to provide local leadership for positive change. Their work aids residents in understanding the political, social and natural forces that impact their lives. They give impacted residents the tools to participate in these processes and to drive change from the bottom.

SCHEDULE AND MATERIALS

WHAT IS ENVIRONMENTAL JUSTICE?

WEEK 1: SYLLABUS REVIEW AND INTRODUCTION TO EJ

MONDAY:

Gross, Liza (2013) "No Bebe el Agua" *Environmental Health News*, June 11.

Retrieved from <http://www.environmentalhealthnews.org/ehs/news/2012/pollution-poverty-and-people-of-color-nitrate-day-4>

Mohai, Paul; Pellow, David; and Roberts, Timmons (2009) "Environmental Justice" *Annual Review of Environment and Resources* 34(1):405-430.

WEDNESDAY:

People of Color Environmental Justice Summit, (1991) "Environmental Justice Principles," available at: <http://www.ejrc.cau.edu/princej.html>

Robert D. Bullard (2001) "Environmental Justice in the 21st Century," available at: <http://www.ejrc.cau.edu/ejinthe21century.htm>

Sze, Julie and London, J. (2008) "Environmental Justice at the Cross Roads." *Sociology Compass* 2(4):1331-1354.

WEEK 2: FOUNDATIONS OF EJ THEORY: RACE, CLASS, JUSTICE, SCIENCE

MONDAY:

Pellow, David, (2000) "Environmental Inequality Formation: Toward a Theory of Environmental Injustice," *The American Behavioral Scientist*, 43, (4):581-601.

Romm, Jeff, (2001) "The Coincidental Order of Environmental Justice." (pp. 117-137) in Mutz et al. *Justice and Natural Resources*.

WEDNESDAY:

Morello-Frosch et al. (2005) "Data Judo: Leveraging Secondary Data Analysis to Build a Community-Academic Collaborative for Environmental Justice in Southern California." (Pp. 371-391) in *Methods in Community-Based Participatory Research for Healthy*.

Liévanos, R. et al. (2011) "Uneven Transformations and Environmental Justice: Regulatory Science, Street Science, and Pesticide Regulation in California." (Pp. 201-228) in *Technoscience and Environmental Justice: Expert Cultures in a Grassroots Movement*, edited by G. Ottinger and B. R. Cohen. Cambridge, MA: Massachusetts Institute of Technology Press.

SOCIAL STRUCTURES AND INEQUALITY

WEEK 3: INEQUALITY IN THE UNITED STATES

MONDAY:

Light, John (2013) "Our Growing Racial Wealth Gap" *Moyers & Company* August 12. Retrieved from <http://billmoyers.com/2013/08/12/our-growing-racial-wealth-gap/>.

Kaufman, Cynthia (2003) Capitalism and Class. In *Ideas for Action: Relevant theory for radical change* (pp. 57-80) Cambridge: South End Press.

Kaufman, Cynthia (2003) Theorizing and Fighting Racism. In *Ideas for Action: Relevant theory for radical change* (pp. 121-149) Cambridge: South End Press.

WEDNESDAY:

Crenshaw, K. (1991) "Mapping the Margins: Intersectionality, Identity Politics, and Violence Against Women of Color." *Stanford Law Review* 43(6):1241-1299.

Watch: Crenshaw's TedTalk

https://www.ted.com/talks/kimberle_crenshaw_the_urgency_of_intersectionality

Nash, Jennifer C (2008) "Re-thinking Intersectionality." *Feminist Review* (89):1-15.

WEEK 4: POSITIONALITY, PRIVILEGE, AND SELF-REFLEXIVITY

MONDAY:

Fortang, Tal (2014) "Checking My Privilege: Character as the Basis of Privilege" *The Princeton Tory* April 2. Retrieved from <http://theprincetontory.com/main/checking-my-privilege-character-as-the-basis-of-privilege/>.

Baudelaire, Violet (2014) "To the Princeton Privileged Kid" May 1. Retrieved from <http://groupthink.jezebel.com/to-the-princeton-privileged-kid-1570383740>.

Rosenberg, Paul (2014) "White privilege 101: Here's the basic lesson Paul Ryan, Tal Fortgang and Donald Sterling need" *Salon.com* May 9. Retrieved from http://www.salon.com/2014/05/09/white_privilege_101_heres_the_basic_lesson_on_paul_ryan_tal_fortgang_and_donald_sterling/.

WEDNESDAY:

McIntosh, P. "White Privilege: Unpacking the Invisible Knapsack."

<https://admin.artsci.washington.edu/sites/adming/files/unpacking-invisible-knapsack.pdf>

Ong, M. (2005). "Body Projects of Young Women of Color in Physics: Intersections of Gender, Race, and Science." *Social Problems* 52(4): 593-617.

Cech, E., Metz, A., Smith, J., deVries, K. (2017) "Epistemological Dominance and Social Inequality: Experiences of Native American Science, Engineering, and Health Students." *Science, Technology, and Human Values* 42(5): 743-774.
<https://doi.org/10.1177/0162243916687037>.

ENGINEERING AND EXPERTISE

WEEK 5: ENGINEERING, TECHNOLOGY, AND IDEAS OF PROGRESS

MONDAY:

Riley, Donna (2008) Mindsets in Engineering. In *Engineering and Social Justice* (pp. 33-45). In Baillie, Caroline (Series Ed.) *Synthesis Lectures on Engineers, Technology, and Society* #7. Morgan & Claypool ebook.

Baillie, Caroline (2009) Engineering and Society. In *Engineering and Society: Working Towards Social Justice Part 1: Engineering and Society* (pp. 13-27). In Baillie, Caroline (Series Ed.) *Synthesis Lectures on Engineers, Technology, and Society* #8. Morgan & Claypool ebook.

Obasanjo, D. (2017) "The Big Lie of the Google Employee's Anti-Diversity Manifesto: Biology is why Women Underrepresented in Tech." *Medium*. Accessible: <https://medium.com/@dareobasanjo/the-big-lie-of-the-google-anti-diversity-manifesto-a-penis-makes-you-better-at-javascript-55ec8f894b78>

WEDNESDAY:

Mitchell, Timothy (2005) The Object of Development. In *Rule of Experts: Egypt, Techno-Politics, Modernity* (pp. 209-243) Berkeley: UC Press.

Verma, Gita (2000). "Indore's Habitat Improvement Project: success or failure?" *Habitat International* 24: 91-117.

WEEK 6: KNOWLEDGE PRODUCTION AND POWER

MONDAY:

Li, Tania (2007) Introduction: The Will to Improve. In *The Will to Improve: Governmentality, Development, and the Practice of Politics* (pp. 1-12) Durham: Duke University Press.

Cohen, Benjamin and Ottinger, Gwen (2011) Introduction: Environmental Justice and the Transformation of Science and Engineering. In *Technoscience and environmental justice: expert cultures in a grassroots movement* (pp. 1-18) MIT Press.

WEDNESDAY:

Goldman, Michael (2005) The Birth of a Discipline: Producing Environmental Knowledge for the World. In *Imperial Nature: The World Bank and Struggles for Social Justice in the Age of Globalization* (pp. 151-180) New Haven: Yale University Press.

Corburn, Jason (2007) “Community knowledge in environmental health science: co-producing policy expertise” *Environmental Science and Policy* 10(2):150-161.

ENVIRONMENTAL ENGINEERING AND VULNERABLE COMMUNITIES

WEEK 7: WASTE, INFRASTRUCTURE, AND RACIAL INEQUALITY

MONDAY:

Grossi, Mark (2013) “Kettleman City reaps toxic harvest of California castoffs” *The Fresno Bee* January 12. Retrieved from <http://www.fresnobee.com/2013/01/12/3131461/kettleman-city-reaps-toxic-harvest.html>.

Hoffman, Steven (2001) “Negotiating Eternity: Energy Policy, Environmental Justice, and the Politics of Nuclear Waste” *Bulletin of Science, Technology, & Society* 21(6):456-472.

WEDNESDAY: GUEST Q&A with author and scholar-activist Dr. Guillermo Douglass-Jaimes, Asst. Professor of Environmental Analysis, Pomona College.

Snyder, R., Jaimes, G., Riley, L., Faerstein, E., Corburn, J. (2014). A Comparison of Social and Spatial Determinants of Health Between Formal and Informal Settlements in a Large Metropolitan Setting in Brazil. *Journal of Urban Health* (91)3: 432-445.

Bullard, Robert and Wright, Beverly (2012) *The Wrong Complexion for Protection: Response to Toxic Contamination. The Wrong Complexion for Protection: How the Government Response To Disaster Endangers African American Communities* (pp. 100-125) New York: NYU Press.

WEEK 8: ENVIRONMENTAL ENGINEERING AND WATER

MONDAY: GUEST Q&A with author and scholar-activist [Dr. Carolina Prado](#), Environmental Health Justice Coalition, San Diego.

Morgan, R. and Smith, J. (2013) “Premodern Streams of Thought in Twenty- First-Century Water Management” *Radical History Review* 116:105-129.

Prado, C. (Forthcoming) “Gendered Epistemologies of the Border and the Save the Alamar River Campaign.”

Rubin, Sara (2013) “Lawmakers scramble to make drinking water a right; meanwhile, contamination in Monterey County is getting worse” *Monterey County Weekly* Jun 13. Retrieved from http://www.montereycountyweekly.com/archives/2013/0613/article_67a4dcfc-d3b2-11e2-873e-001a4bcf6878.html.

WEDNESDAY: FIELD TRIP WITH COMMUNITY PARTNER: Amigos De Los Rios/Friends of the River, Del Monte, CA*

*Possible community partner to reconnect with, as I conducted an internship with Amigos de los Rios as an undergraduate at Pomona College

Hager, G. *et al.* (2013) “Socioecological revitalization of an urban watershed” *Frontiers in Ecology and the Environment* 11:28–36.

WEEK 9: ATMOSPHERES AND CLIMATE JUSTICE

MONDAY:

Tarr, Joel (2004) Afterword. In DuPuis, Melanie (Ed.) *Smoke and Mirrors: The Politics and Culture of Air Pollution* (pp. 337-341) New York: NYU Press.

Harrison, Jill (2004) Invisible People, Invisible Places: Connecting Air Pollution and Pesticide Drift in California. In DuPuis, Melanie (Ed.) *Smoke and Mirrors: The Politics and Culture of Air Pollution* (pp. 288-304) New York: NYU Press.

Hackbarth, Andrew; Romley, John; Goldman, Dana (2011) “Racial and ethnic disparities in hospital care resulting from air pollution in excess of federal standards” *Social Science & Medicine* 73(8):1163-1168.

WEDNESDAY:

Morello-Frosch, Rachel *et al.* (2009) The Climate Gap: Inequalities in How Climate Change Hurts Americans & How to Close the Gap. Retrieved from http://dornsife.usc.edu/pere/documents/ClimateGapReport_full_report_web.pdf .

Logan, Mary (2012) “Is climate change a euphemism for growth?” *A Prosperous Way Down* September 29. Retrieved from <http://prosperouswaydown.com/climate-euphemism-growth/>.

INNOVATING ENGINEERING ETHICS

WEEK 10: FUELING EMPIRE AND MILITARISM

MONDAY:

Mitchell, Timothy (2011) Introduction and Fuel Economy. In *Carbon Democracy: Political Power in the Age of Oil*. (pp 1-11, 109-143) London: Verso.

Monbiot, George (2014) “The Impossibility of Growth” May 27. Retrieved from <http://www.monbiot.com/2012/06/22/how-sustainability-became-sustained-growth/>.

WENESDAY:

Alexander, Michelle (2010) Introduction. In *The New Jim Crow: Mass Incarceration in the Age of Colorblindness* (pp. 1-19) New York: The New Press.

Loyd, Jenna M. *et al* (2012) Introduction: Borders, Prisons, and Abolitionist Visions in Jenna M. Loyd *et al.* (Eds.) *Beyond Walls and Cages: Prisons, Borders, and Global Crisis* (pp. 1-15) Athens: University of Georgia Press.

WEEK 11: SUSTAINABILITY AND ACTIVISM

MONDAY:

Huesemann, Michael and Huesemann, Joyce (2011) The Design of Environmentally Sustainable and Socially Appropriate Technologies. In *Techno-Fix: Why Technology Won't Save Us or the Environment* (pp. 295- 312)

Huesemann, Michael and Huesemann, Joyce (2011) Introduction. In *Techno-Fix: Why Technology Won't Save Us or the Environment* (pp. xxiii-xxviii) Gabriola Island, BC: New Society Publishers.

Sullivan, K. (2016) "Voices from Standing Rock" *The Washington Post* December 2. Retrieved from http://www.washingtonpost.com/sf/national/2016/12/02/voices-from-standing-rock/?utm_term=.2e1cbc555c3f.

WEDNESDAY:

Schmidt, Jon (2013) "Changing the Paradigm for Engineering Ethics" *Sci Eng Ethics*, accessed online.

Karwat, Darshan; Eagle, Walter; Wooldridge, Margaret; and Princen, Thomas (2014) "Activist Engineering: Changing Engineering Practice By Deploying Praxis" *Sci Eng Ethics*, accessed online.

Huesemann, Michael and Huesemann, Joyce (2011) Critical Science and Social Responsibility. In *Techno-Fix: Why Technology Won't Save Us or the Environment* (pp. 313-338) Gabriola Island, BC: New Society Publishers.

WEEK 12: ENVIRONMENTAL JUSTICE PRAXIS AND ANALYSIS

MONDAY: COMMUNITY-PARTNER GROUP PROJECT AND RESEARCH PAPER PRESENTATIONS

WEDNESDAY: COMMUNITY-PARTNER GROUP PROJECT AND RESEARCH PAPER PRESENTATIONS

WEEK 13: ENGINEERING AND SOCIAL JUSTICE PRAXIS

MONDAY:

D. Edmunds, R. Shelby, A. James, M. Baker, Y. Perez, and K. Tallbear. (2013) "Tribal Housing, Co-Design & Cultural Sovereignty." *Science, Technology & Human Values*. 38(6):801-828.

Riley, Donna (2008) Engineering and Social Justice. In *Engineering and Social Justice* (pp. 47-106). In Baillie, Caroline (Series Ed.) *Synthesis Lectures on Engineers, Technology, and Society*. Morgan & Claypool ebook.

Cole, T. (2012) "The White Savior Industrial Complex" *The Atlantic*, March 21.

WEDNESDAY:

Riley, Donna (2008) Toward a More Socially Just Engineering. In *Engineering and Social Justice* (pp. 107-123). In Baillie, Caroline (Series Ed.) *Synthesis Lectures on Engineers, Technology, and Society*. Morgan & Claypool ebook.

Riley, Donna (2008) Parting Lessons for the Continuing Struggle. In *Engineering and Social Justice* (pp. 143-149). In Baillie, Caroline (Series Ed.) *Synthesis Lectures on Engineers, Technology, and Society*. Morgan & Claypool ebook.