**EGR 390**
**Science, Technology, and Ethics**
**Professor Donna Riley**
**Picker Engineering Program**
**Smith College**

Who decides how science and engineering are done, who can participate in the scientific enterprise, and what problems are legitimately addressed within these disciplines and professions? Under what conditions has science aided and abetted racist or colonialist research projects? What are the roles of technology, culture, and economic systems in the drive toward bigger, faster, cheaper, and more automated production of goods, and what are the consequences for human relationships and for the environment? When technology provides means for control, for example in military, information, reproductive or environmental applications, what rights and responsibilities follow? Using readings from philosophy, science and technology studies, and feminist and postcolonial science studies, we will examine such questions and encounter new models of science and engineering that are responsive to ethical issues.

**Objectives:** Students receiving a passing grade in this class shall be able to:
- Think critically about science, technology, and ethics, identifying and analyzing a variety of ethics problems.
- Lead insightful discussions on science, technology, and ethics topics.
- Conduct original research into a topic in science, technology, and ethics.
- Effectively communicate in oral and written forms the findings of original research on science, technology and ethics.
- Explain the complex relationships among science, technology, and ethics in current social contexts, and how these contexts inform and influence social choices about science, technology, and ethics.
- Act creatively and reflectively in the world to address science, technology, and ethics.
- Assess and direct your own learning, and reflect on that process.


**Evaluation:** (subject to change per self-directed learning proposal)
70% Papers
    30% 2 Action-essays – one on science and objectivity, one case study exploring 3 distinct approaches (5 pages double spaced, 15% each)
    40% Research paper – proposal & annotated bibliography (5%), outline (5%), draft (10%), final (20%) (20 pages double spaced)
30% Participation
    10% Self-directed learning proposal and end of semester reflection (5% each)
    10% Leading creative class activities (in pairs, 3-4 times during the semester)
    10% Preparation (reading questions and notes)

| Date | Material covered | Class Learning objectives | Preparation expected | Work due |
|------|------------------|---------------------------|----------------------|----------|
| **Week 1** | | | | |
| 9/4 | Intro to course themes | Watch Film: Fast, Cheap and out of Control Part I | | |
| **Week 2** | | | | |
| 9/9 | Intro to course themes | Watch Film: Part II Discuss Film, Johnson | Read Jaehne, Johnson & Wetmore | **Self-Directed Learning Proposal** |
| 9/11 | Questioning Objectivity of Science & Technology | Discuss Winner, Harding, and Martin | Read Winner, Harding, Martin | |
| **Week 3** | | | | |
| 9/16 | Questioning Objectivity | | | |
| 9/18 | Ethics Approaches | | Read Weston, Warren, Catalano | |
| **Week 4** | | | | |
| 9/23 | Ethics Approaches | | | |
| 9/25 | Funding and Practice of Science and Technology | | Read McCutchen, Geiger, Downey | **Term Paper Proposal & Annot. Bibliography** |
| **Week 5** | | | | |
| 9/30 | Technology and Control: Information Technology | Student-led | Read Nissenbaum, Parsell | |
| 10/2 | | Work on Research Topic | | |
| **Week 6** | | | | |
| 10/7 | | Research Help Session  Bass 103 | | |
| 10/9 | Technology and Control: Information Technology | Student-led | Read Kuflik, Galloway | |
| **Week 7** | | | | |
| 10/14 | F A L L   B R E A K | | | |
| 10/16 | Technology and Control: Military Technology | Student-led | Read Hagen, Gillespie | **Action Essay: Objectivity** |
| **Week 8** | | | | |
| 10/21 | Technology and Control: Reproductive Technology | Student-led | Read Tremain, Purdy, Garry | |
| 10/23 | Technology and Control: Environmental Technology | Student-led | Read Lockwood, Katz | |

| Week 9 | | | | |
|---|---|---|---|---|
| 10/28 | Science & Social Inequality: Cultures of Injustice | Student-led | Read Frehill, Subramaniam | **Term Paper Outline & Revised Bibliography** |
| 10/31 | Science & Social Inequality: Cultures of Injustice | Student-led | Read Walton, Harding | |
| Week 10 | | | | |
| 11/4 | Science and Social Inequality: Racist Projects | Student-led | Read Jones | |
| 11/6 | | Otelia Cromwell Day | | |
| Week 11 | | | | |
| 11/11 | Science and Social Inequality: Racist Projects | Student-led | Read Proctor, Schweitzer | **Action Essay: Case Study** |
| 11/13 | Technology and Consumerism: Fast | Student-led | Read Schlosser, Slade | |
| Week 12 | | | | |
| 11/18 | Technology and Consumerism: Privatized | Student-led | Read Bollier | |
| 11/20 | Technology and Consumerism: Globalized | Student-led | Read Mashelkar, Shiva | |
| Week 13 | | | | |
| 11/25 | Dissent | Student-led | Read vonHippel, Nader, websites of local citizen groups | **Term Paper draft with abstract** |
| 11/27 | THANKSGIVING BREAK | | | |
| Week 14 | | | | |
| 12/2 | Feminist Re-visioning | Student-led | Read Weasel, Barad | |
| 12/4 | Term Papers | Student Presentations | Read Abstracts | |
| Week 15 | | | | |
| 12/9 | Engineering, Social Justice, and Peace | Student-led | Read Vesilind, Catalano, Riley | **Self-directed Learning Reflection** |
| 12/11 | Wrap-Up and review | End of Course survey | | |
| Finals Week | | | | |
| 12/19 | | | | **Term Paper** |

**Readings List**

**Introduction**
Jaehne, K. Fast Cheap and out of Control. *Film Quarterly* **52**(3): 43-47. 1999.
Johnson, D.G. and Wetmore, J. STS and Ethics: Implications for Engineering Ethics. *Technology & Society: Building our Sociotechnical Future* (MIT Press, forthcoming).

**Science and Objectivity**
Winner, L. Do artifacts have politics? *The Whale and the Reactor*. University of Chicago Press, 1986. pp. 19-39.
Harding, S. The Political Unconscious of Western Science. *Science and Social Inequality: Feminist and postcolonial issues*. University of Illinois Press, 2006. pp 113-132.
Martin, E. 1991. "The Egg and the Sperm: How Science Has Constructed a Romance Based on Stereotypical Male-Female Roles" *Signs: Journal of Women in Culture and Society* **16** (3):485-501.

**Some approaches to ethics**
Warren, K. Ethics in a Fruit Bowl. *Ecofeminist Philosophy*, New York: Rowman & Littlefield, 2000. 97-123.
Catalano, G.D. *Engineering Ethics: Peace, Justice, and the Earth*. Morgan and Claypool, 2006. 13-22.
Weston, A. "Practical Ethics in a New Key" and "Pragmatic Attitudes." *Toward Better Problems: New Perspectives on Abortion, Animal rights, the Environment, and Justice*. Philadelphia: Temple University Press, 1992.

**The Funding and Practice of Academic Science and Technology**
McCutchen, C.W. "Peer Review: Treacherous Servant, Disastrous Master" *Technology Review* (October 1991): 27-40.
Geiger, R. Science, Universities, and National Defense, 1945-1970. *OSIRIS*, 2nd series, 1992, **7**: 26-48.
Downey, G.L. (2007) Low Cost, Mass Use: American Engineers and the Metrics of Progress. *History and Technology*, **23**(3): 289-308.

**Technology and Control Part 1: Information Technologies**
H. Nissenbaum, Privacy as Contextual Integrity, *Washington Law Review*, v79 #1, February 04, 2004. 119-158.
Parsell, M. Pernicious virtual communities: Identity, polarization and the Web 2.0. *Ethics and Information Technology*. (2008). Galloway, A.R. Playing the Code: Allegories of Control in Civilization. *Radical Philosophy*, **128**: 33-40 (2004).
Kuflik, A. Computers in Control: Rational Transfer of Authority or Irresponsible Abdication of Autonomy? *Ethics and Information Technology* **1**(3): 173-184.

**Technology and Control Part 2: Military Technologies**
Hagen, R. (Un-) Peaceful use of space. 13th General Assembly of the International Association of Peace Messenger Cities: "Peace, Poverty, Racism: the Role of the Cities." City of Oswiecim (Poland) - September 3, 2000. Later published as War and Peace in Space, *The Spokesman* **70**: 34-43.
Gillespie, C. and Alder, K. Engineering the Revolution. *Technology and Culture* 39, No. 4 (Oct., 1998), pp. 733-754

**Technology and Control Part 3: Reproductive Technologies**
Tremain, S. Reproductive Freedom, Self-Regulation, and the Government of Impairment in Utero. *Hypatia*, **21**(1): 35-53 (2006).
Purdy, L.M. Medicalization, medical necessity, and feminist medicine. *Bioethics* **15**(3): 248-261. (2001)
Garry, A. Medicine and Medicalization: A Response to Purdy. *Bioethics* **15**(3): 262-269. (2001)

**Technology and Control Part 4: Environmental Technologies**
Lockwood, J.A. The Ethics of Biological Control: Understanding the Moral Implications of Our Most Powerful Ecological Technology, *Agriculture and Human Values* **13**(1): 2-19 (1996).
Katz, E. The Call of the Wild, *Environmental Ethics*, **14**(3): 265-274 (1992).

**Science and Social Inequality: Cultures of Injustice**

Frehill, L.M. The Gendered Construction of the Engineering Profession in the United States, 1893-1920, *Men and Masculinities* **6** (4): 383-403 (2004).

Walton, A. Technology vs. African-Americans, *Atlantic Monthly*, January 1999, 14-18.

Subramaniam, B. "Snow Brown and the Seven Detergents: A Meta-Narrative on Science and the Scientific Method." *Women's Studies Quarterly*. Vol. 28. Nos. 1&2, Spring/Summer 2000.

Harding, S. "Thinking about Race and Science," *Science and Social Inequality: Feminist and postcolonial issues*. University of Illinois Press, 2006. pp. 17-30.

**Science and Social Inequality: Racist Projects**

Proctor, R. Political Biology: Doctors in the Nazi cause, *Racial Hygiene: Medicine under the Nazis*. Harvard University Press, 2006. pp. 64- 94

Jones, *Bad Blood: The Tuskeegee Syphilis Experiment*. Free Press, 1993. pp 1-15, 61-77, 206-219

Schweitzer, S. Issues of body, spirit snarl return of Narragansett remains. *Boston Globe*, December 20, 2004.

**Materialism: Fast, Privatized, Globalized**

Schlosser, E. "Speedee Service," "Throughput," "Stroking," and "Food Product Design," *Fast Food Nation*, HarperCollins, 2002, pp. 18-21, 67-71, 71-75, and 119-129.

Slade, G. *Made to break: technology and obsolescence in America*. Cambridge, MA: Harvard University Press, 2006. 29-55, 261-281.

Bollier, D. *Silent Theft: The private plunder of our common wealth*. Routledge, 2003. 15-25, 69-84, 119-134.

Mashelkar, R.A. Intellectual property rights and the Third World. *Current Science*, **81**(8):955-965 (2001). www.ias.ac.in/currsci/oct252001/955.pdf

Shiva, V. The World Bank, WTO, and Corporate Control over Water. *Water Wars*, South End Press, 2002. pp. 87-105.

**Dissent**

vonHippel, F. Advice and Dissent, *Citizen Scientist*. Touchstone, 1991. pp.3-15, 30-54.

Nader, R. Preface and The Engineers, *Unsafe at Any Speed*, New York: Grossman, 1972, pp. lxxxix-xciii, 170-209.

**New Feminist Visions**

Barad, K. "Scientific Literacy -> Agential Literacy = (Learning + Doing) Science Responsibly," in *Feminist Science Studies: A New Generation*, edited by Maralee Mayberry, Banu Subramaniam, and Lisa Weasel. NY: Routledge Press. (Abridged version of article published in Doing Culture + Science), 2001.226-246.

Weasel, L. "Laboratories without Walls: The science shop as a model for feminist community science in action." in *Feminist Science Studies: A New Generation*, edited by Maralee Mayberry, Banu Subramaniam, and Lisa Weasel. NY: Routledge Press, 2001. 305-320.

**Engineering, Social Justice, and Peace**

Vesilind, P. Aarne (2005). The Evolution of Peace Engineering. In *Peace Engineering: When Personal Values and Engineering Careers Converge*. A. Vesilind, ed. Lakeshore Press: Woodsville, NH, 1-12.

Catalano, G.D. *Engineering Ethics: Peace, Justice, and the Earth*. Morgan and Claypool, 2006. 33-54.

Riley, D. *Engineering and Social Justice*. Morgan and Claypool, 2008.

# Proposal for Self-Directed Learning
## EGR 390
## Science, Technology, and Ethics
## Fall 2008

You will have the freedom and responsibility to determine your own course of learning collectively and individually, based on your interests and schedule.  Your proposal of 3-5 pages shall include:

a.  Background information on why you are choosing to take this class and what you hope to get out of it – how it relates to your development as a learner, and as a whole person, and how it relates to your overarching professional goals. (There are big questions here – why are you pursuing a bachelor's degree? At a liberal arts college? In a particular major? How does each of these choices relate to who you are, who you seek to become, and the values you hold?)

b.  A list of objectives, including the course objectives from the syllabus (you may suggest changes to these), plus 1-3 additional objectives you wish to set for your learning in this class.

c.  A list of questions you would like to explore in order to meet the complete list of objectives, and a course map of how these topics relate to the objectives. (Note: the term paper and action essays represent opportunities for you to explore topics of interest to you, and/or meet specific objectives. Specific ideas you might explore as part of each of these assignments could be included.)

d.  A list of resources. These might include people, readings, films – anything or anyone that supports your learning. It is not possible to provide a complete or specific list of these at this point, but you should provide suggestions and examples of the types of resources you would like to include (these could add to or replace some course content). Science, technology and ethics issues are constantly in the news (e.g.,  energy and climate).

e.  A plan for evaluating and assessing how you will meet the learning objectives. How is this best measured? From whom would you like to receive feedback? Of what type, and how frequently? What does it mean to learn the material? What is the right balance between quality and quantity, breadth and depth, product and process? Which course elements should be graded (if any), and at what weights?

f.   A fun, "working title" for the course –– e.g., "Fast, Cheap, and out of Control!"

**EGR 390**
**Science, Technology and Ethics**
**Fall 2008**
**Guidelines for Term Papers**

The term paper should be **15-20** pages in length (12 point, double-spaced) and should focus on a specific problem in science, technology, and ethics (e.g., the decision to site a nuclear waste facility at Yucca Mountain or the ethics of public participation processes for LULUs (locally unwanted land uses)). The length of the paper is far less important than how much it has to say. Topics need to be narrow enough to be accomplishable in a semester. Some examples from previous semesters include:

- US Corporate Responsibility in the Developing World: Doe Run's mining operation in La Oroya, Peru
- Ethical Implications of South African AIDS Policies: Traditional vs. Western medicine
- Ethical dimensions of Bridge maintenance: Whitestone Bridge vs. I-35W Bridge

**Deadlines and Work Schedule**

| Dates | Ongoing Activity | Deadlines and Deliverables |
|---|---|---|
| Now-Sep 25 | **Topic Exploration and Refinement**. Collect sources on your topic (be sure to include the ethics literature). Explore these sources and narrow your topic accordingly. Request items early, especially interlibrary loan items. | Proposal and Annotated Bibliography due **September 25.** Include a 1-2 page description of the topic and the questions you are posing, and a list of references identified so far with a brief description of each one's relevance to the paper. |
| Sep 30 – Oct 9 | **Feedback, Topic Refinement, further Research.** Request additional materials based on feedback from your proposal | Goal - Try to have ALL materials in your hands by fall break. Obviously your topic needs to be *set*. |
| Oct 9- Oct 28 | **Develop an argument, conduct research**. Read collected materials and develop an outline detailing your argument. Maintain your bibliography by adding new sources and setting aside (but not deleting) ones you do not intend to cite in the paper. | Detailed Outline and Revised Bibliography due **October 28.** The outline should be detailed enough that one can tell paragraph by paragraph what the paper is likely to say. Arguments and key questions should be clearly laid out. The revised bibliography need not be annotated. |
| Oct 28 – Nov 4 | **Write**. Working from your outline, write a first draft of your paper and an abstract that summarizes your question and findings. | First draft due **November 4**. Sign up the week of Nov. 3 for appointments the week of Nov. 10. Sign up Nov. 10 for appointments the week of Nov. 17. |
| Nov 4 - Nov 25 | **Revise**. Meet with Jacobson Center staff to improve your draft before submitting it to me for feedback. | Paper draft and abstract (150-300 words) due **November 25**. The abstracts will be posted on Moodle to share with the class prior to oral presentations. |
| Nov 25- Dec 19 | **Final Revisions**. Respond to feedback on the draft. | Oral presentations (<10 minutes) in the last two weeks of class to receive additional feedback. Final draft due on or before 4pm **December 19**. |

**Evaluation**
The term paper is worth 40% of your course grade, broken down as follows:
40% Term Paper
    5% Proposal of Topic and Annotated Bibliography
    5% Outline and updated annotated bibliography
    10% Draft
    20% Final Draft

**Audience**
When you think of a topic, think also of who might be interested in the results of your research. For whom are you writing the paper? Is there potential for collaboration with interested persons or groups? The College encourages these kinds of links to the community (as do I) and we can work together to set up a relationship with interested collaborators, if this is something you would like to do (but note it is a great deal more work).

**Framework**
You may use any framework you wish to suit your needs, but the paper should be well structured. One example paradigm is the systems analytic approach, namely:

- Characterize the problem, framing the issues clearly.
- Identify critical facts and values that are relevant to the case, including areas of uncertainty.
- Identify stakeholders and decision makers.
- Identify key criteria for evaluating potential resolutions to the problem
- Describe a number of actions that might be taken to resolve the problem or at least ameliorate the situation
- Forecast possible consequences of actions that might be taken
- Assess the consequences and the actions themselves against the evaluation criteria
- Recommend a course of action, or draw a conclusion about interesting issues at play, etc.

Clearly this is just one approach that may not be appropriate for all analyses. Choose and use an approach that is appropriate for your topic.

**Approaching the topic**
BACKGROUND: What is the issue? Is it agreed upon by all stakeholders? Are there hidden issues? What key facts are in dispute?

PERSPECTIVES: Who are the experts on each side? Do they talk to or past each other? What kinds of information and analysis do they have and how does it bear on the issue?

1. Technical Experts: How well has the technical background been developed on the issue? Who has generated this material, and do they have positions on the issue? Where is more work needed? Are there any biases in the framing of their analysis that limit the ethical alternatives?
2. Ethics Experts: What ethics analyses are available on the issue, and how do they present the technical material? What are their biases? What is their set of alternatives? Here you might want to undertake a comparative analysis, where you ask how different ethicists grounded in different perspectives approach the issue. What are the advantages and drawbacks of each position? What new approaches would you like to see, and/or old approaches would you like to see pursued in a different way? Describe the trade-offs involved. How are questions being framed by each? What new questions would you pose?
3. Lay Perspectives: What do concerned citizens and policy-makers need to understand in order to be able to make a decision on the issue? What are the forums in which the issue has been or is being debated (media, academia, internal discussions in a responsible local, state or national agency, open hearings, courts, professional societies, the general public)?

## DOs and DON'Ts

| DO | DON'T |
|---|---|
| Use *credible* sources. Reference factual statements and conclusions for which you do not provide a full basis in your paper | Neglect to cite sources |
| Decide what the key technical analyses are that bear on ethical issues discussed in your paper and explore them in some depth if they are at all uncertain or controversial | Write an editorial |
| Build an argument.  Support it with facts, and with established approaches to ethics. Let your findings lead you to your conclusions. Where evidence is mixed, explain the situation and sort out the reasons. | Average differing perspectives and say "evidence is largely negative"  or "people mostly think…"  sometimes the minority is right! |
| Put statements into perspective. For example, all pollution is bad but there are some sources that don't add significantly to the background pollution level and others do. Explain how good or bad something is by putting it into some such perspective | Be vague. Don't say "X may happen" without giving some sense of the likelihood implied. Don't make statements like "some policy makers say" or "experts say"… or "They should do X"… Say who! |
| Articulate values and assumptions. Identify uncertainty and follow different scenarios presented by uncertainty. | Jump to conclusions. |
| Apply the work of others in new ways to say something original. | Only report other people's work. Don't over-quote, but paraphrase where appropriate (with citations!). |
| Be concise. | Be verbose or redundant, or include superfluous space filler |
| Include diagrams, tables, and schematics that help illustrate your points | Put meaningless figures in simply for the sake of breaking up the text. |

## Ask yourself…

1. Was I able to uncover interesting and relevant information addressing my problem?
2. Was I able to use this information in a clearly explained, original analysis?
3. Did I take well-reasoned positions substantiated by my analysis?
4. Was the paper balanced and did I state the limitations of the analysis?
5. Was the paper logical and organized?
6. Was the writing style clear, concise, interesting, and free of spelling and grammatical errors?

The action essays in this class are designed to employ Marx's notion of praxis as a tool for deepening your learning by engaging your community, creating the opportunity for both personal and social transformation.

> The question whether objective truth can be attributed to human thinking is not a question of theory but is a ***practical*** question. Man [sic] must prove the truth, i.e., the reality and power, the this-worldliness of his [sic] thinking in practice. The dispute over the reality or non-reality of thinking which is isolated from practice is a purely ***scholastic*** question….The philosophers have only ***interpreted*** the world in various ways; the point is to ***change*** it. (Marx 1845)[1]

### Theory and practice

It is easy in an academic setting, and perhaps particularly in an ethics class, to rest on the traditional notion that practice follows from theory, that we can think about what is ethical, and ethical action will result. The notion of ***praxis*** (sometimes called reflective action) challenges this conventional wisdom to suggest that sometimes we know what is ethical by doing what is right first, then theorizing what we know from experience, and revolving the theory and practice into transformative action.  Smith (1999)[2] makes the following key points about praxis:

- Praxis always begins with relationships, with a problem or question that arises in community.
- There are no assumptions about what the right process to follow is, or what the right solution/end result is. Process and product, ends and means, thought and action, the general and the specific, the theoretical and the practical are in constant exchange and dialogue. As we think about answers or solutions or goals for change, the process for getting there may change. And as we go about the process, the end goals may change.  This process must involve communication, and it is fundamentally relational.

Smith (1999) therefore calls praxis "informed, committed action." More than just action that follows on reflection, *praxis* embodies "a commitment to human well being and the search for truth, and respect for others. It is the action of people who are free, who are able to act for themselves. Moreover, *praxis* is always risky." It requires critical thinking and ethical judgment. It is "not merely the doing of something," it is "creative," "other-seeking and dialogic."

### Action Essays

The action essays challenge you to explore some ethical questions or problems that arise in your communities by getting involved with some science, technology and ethics issues, connecting the real world with what you are learning in class.

*Topic 1: Science and Objectivity*. Explore the notion of science and objectivity in your life by choosing an instance in which science and objectivity come up (this could be anything from a media report on an issue that's important to you to a classroom experience to extracurricular involvements). Take some action in response to this emergence of science and objectivity – this could be a contribution to a classroom discussion, or a letter to the editor of a paper or website. It could be a blog or a youtube video. It could be participating in an organization seeking change. Try to identify the possibilities for change and choose a course of action informed by the situation and the full range of possible actions. Write a short paper discussing your action in context. Describe the situation and how science and objectivity factored in. How do the Winner, Harding, and Martin readings relate to the instance, and to your action? Why did you choose the action you did, and what was the result? How are you transformed by the experience?

*Topic 2: Case Study*. Write a science, technology and ethics case study that grows out of personal experience. The case should be a real one in which you were directly involved. It could be any kind of situation – for example, something you faced on an internship, like coming forward about a mistake you made, or something you face as a citizen of the planet, like working to halt global climate change, or something in between, like campus or community activism on a science/technology issue.  Can you connect a course reading to the situation? Why did you choose the action you did, and what was the result? How are you transformed by the experience?

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[1] Marx, K. [1845] (1976) Theses on Feuerbach. In Marx, K and Engels, F. Collected Works of Karl Marx and Friedrich Engels, 1845-47, Vol. 5: Theses on Feuerbach, The German Ideology and Related Manuscripts. New York: International Publishers, 1976.

[2] Smith, Mark K. (1999). Praxis. The Informal Education Web. Accessed August 21, 2007 from http://www.infed.org/biblio/b-praxis.htm