SCSO 1900 Fall 2009 Syllabus

Instructor/Contact: Anne Fausto-Sterling (Anne_Fausto-Sterling@brown.edu)

Meetings by appointment: (make appointments at the end of class or contact Michele_Duff@brown.edu)

Grade: Mandatory S/NC

Class Meetings: Wednesdays 3-5:30 Sidney Frank Hall (Life Sciences Bldg.) Room 250)

Required Text: Readings available on line or on reserve at the Sciences Library

I. Learning Goals: Content

Science and Technology Studies (STS) is a highly interdisciplinary field. Each of the component disciplines raises its own questions about science and technology. Each discipline uses different methods to answer these questions. You can bring to bear an understanding of these several approaches on problems you are trying to solve. Below I list critical questions from each of the contributing STS fields and offer some relevant readings to help you understand each approach. By the end of the semester you will be expected to have completed most of these readings. I don't say "all" because some of the readings are introductory, and if you already know the material you can choose a different reading. One of the learning goals is for you to understand something of how STS scholars address some of the critical questions listed below.

- *Philosophy and Ethics*: How do we construct scientific knowledge? Are there objective truths? Are technologies value-neutral? Are technology and society distinct entities? In what ways can society influence the course of scientific research? What is the relationship between science and technology? Ethics: What is the purpose of science? How should we distribute the risks and benefits of science and technology? What responsibilities do scientists have for the knowledge they create? What are the limitations of professional ethics?

1. Sismondo, Sergio (2004) *An Introduction to Science and Technology Studies*. Chapters 2 and 16 (available on my courses)
2. Hess, David J. (1997) *Science Studies: An Advanced Introduction*. (available on My Courses) Chapter 2.
3. Hackett, Edward et al (editors) *The Handbook of Science and Technology Studies*, 3rd Edition (2008) Chapter 23. (available on My Courses)

- *History*: What are the uses of history? What can history tells us about the structure of contemporary science and technology? How has science and technology changed our economy? How do corporations, national governments, and local governments shape technological development, and what consequences have this had? How did scientists conceptualize scientific knowledge in the past?

1. Daston, Lorraine and Galison, Peter. *Objectivity*. (2007) Chapter 3. (available on My Courses)
2. Shapin, Steven (1988) "House of Experiment in 17th Century England" ISIS 79: 373-404. (Available on My Courses).

- *Sociology*: How do large organizations such as governments and universities structure the production of scientific knowledge? What social conditions bring about states of belief or knowledge? How to social structures such as race and/or gender structure scientific knowledge? How does technology shape our workplace? Does it help us understand science and technology of we divide the world into "the natural" and "the social"?

1. Sismondo Chapters 3, 4, 5 (available on My Courses)
2. Hess, Chapter 3 (available on My Courses)
3. Latour, Bruno (2005). *Reassembling the Social: An introduction to Actor-Network Theory.* pp. 64-70 and 141-156 (available on My Courses)
4. *The Handbook* Chapter 5 (available on My Courses)

- *Political Science*: What is the proper sphere of public involvement? What are the rights of the corporation? What are the rights of individuals? What is democracy? How do we balance the use of expert knowledge against lay knowledge? How can participatory democracy work if we pay greatest attention to elite experts? How do the regulatory apparatuses of our government work and in whose interest? What is meant by the phrase "public understanding of science" and how can we achieve it?

1. The Handbook Chapters 3, 19, 20 (available on My Courses)
2. Hess Chapter 5 (available on My Courses)

- *Anthropology*: How is knowledge produced through daily interactions inside the laboratory, i.e. what does "science in action" look like and what can we learn from watching it? Do different cultures produce different forms of scientific knowledge, or is all scientific knowledge universal? Is "native knowledge" scientific, and if not, what happens when scientists draw it into the laboratory? How do actors in a social conflict concerning science interact and form networks that succeed (or not) in resolving controversies?

1. Sismondo: Chapters 7 & 9 (available on My Courses)
2. Latour, Bruno (1987) *Science in Action* Chapter 2(available on My Courses)
3. Watson-Verran, Helen and David Turnbull (1995) "Science and other Indigenous Knowledge Systems" in *The Handbook 2nd Edition* (available on My Courses)

- *Feminist Science Studies*. This field crosscuts the foundational STS disciplines and examines the question of gender and knowledge production. Is knowledge gendered? If so, how does it become that way? What if any, is the relationship between the sex of the knowledge producer and the nature of the knowledge produced? Why is there a gender imbalance among working scientists? In addition to this list of readings, there is an extensive bibliography on Feminist Science Studies posted on My Courses.

1. Wylie, Alison (2002) "The Engendering of Archeology: Refiguring Feminist Science Studies" (in Kourany, available on My Courses)
2. Harding, Sandra (2002) "Strong objectivity: a response to the New Objectivity Question" in Kourany, Janet, available on My Courses.
3. Haraway, Donna (2002) "Situated Knowledges: the Science Question in Feminism and the Privilege of Partial Perspective" (in Kourany, Janet, available on My Courses)
4. Sismondo, Chapter 13.(available on my courses)

II. Learning Goals: Skills

a. To analyze problems in science and technology using the disciplinary and methodological approaches discussed in CONTENT component of the course. Problems may be past, current or emerging. Some examples of such problem solving may be found in the following (mostly) recent books by STS scholars.

As a Class, we will choose one of the books listed below focusing not only on the content, but also to see how mature scholars analyze problems in science and technology.

i. Rajan, Kaushik Sunder. *Biocapital: The Constitution of Postgenomic Life*. (2006).

Kaushik Sunder Rajan argues that contemporary biotechnologies such as genomics can only be understood in relation to the economic markets within which they emerge.He conducted fieldwork in biotechnology labs and in small start-up companies in the United States (mostly in the San Francisco Bay area) and India (mainly in New Delhi, Hyderabad, and Bombay) over a five-year period spanning 1999 to 2004. He draws on his research with scientists, entrepreneurs, venture capitalists, and policymakers to compare drug development in the two countries, examining the practices and goals of research, the financing mechanisms, the relevant government regulations, and the hype and marketing surrounding promising new technologies. In the process, he illuminates the global flow of ideas, information, capital, and people connected to biotech initiatives.

ii. Rose, Nikolas *The Politics of Life Itself: Biomedicine, Power and Subjectivity in the 21st Century* (2007).

The Politics of Life Itself offers a much-needed examination of recent developments in the life sciences and biomedicine that have led to the widespread politicization of medicine, human life, and biotechnology. Nikolas Rose analyzes contemporary molecular biopolitics, examining developments in genomics, neuroscience, pharmacology, and psychopharmacology and the ways they have affected racial politics, crime control, and psychiatry. Rose analyzes the transformation of biomedicine from the practice of healing to the government of life; the new emphasis on treating disease susceptibilities rather than disease; the shift in our understanding of the patient; the emergence of new forms of medical activism; the rise of biocapital; and the mutations in biopower.

iii. Thompson, Charis.(2007*) Making Parents: The Ontological Choreography of Reproductive Technologies*

Assisted reproductive technology (ART) makes babies and parents at once. Drawing on science and technology studies, feminist theory, and historical and ethnographic analyses of ART clinics, Charis Thompson explores the intertwining of biological reproduction with the personal, political, and technological meanings of reproduction. She analyzes the

"ontological choreography" at ART clinics -- the dynamics by which technical, scientific, kinship, gender, emotional, legal, political, financial, and other matters are coordinated -- using ethnographic data to address questions usually treated in the abstract. Reproductive technologies, says Thompson, are part of the increasing tendency to turn social problems into biomedical questions and can be used as a lens through which to see the resulting changes in the relations between science and society.

iv. Herrnstein Smith, Barbara. *Scandalous Knowledge: Science, Truth and the Human* (2005).

Throughout the recent culture and science "wars," the radically new conceptions of knowledge and science emerging from such fields as the history and sociology of science have been denounced by various journalists, scientists, and academics as irresponsible attacks on science, absurd denials of objective reality, or a cynical abandonment of truth itself. In Scandalous Knowledge, Barbara Herrnstein Smith explores and illuminates the intellectual contexts of these crude denunciations. A preeminent scholar, theorist, and analyst of intellectual history, Smith begins by looking closely at the epistemological developments at issue. She presents a clear, historically informed, and philosophically sophisticated overview of important twentieth-century critiques of traditional—rationalist, realist, positivist—accounts of human knowledge and scientific truth, and discusses in detail the alternative accounts produced by Ludwik Fleck, Thomas Kuhn, Michel Foucault, Bruno Latour, and others.

v. Harding, Sandra. *Sciences from Below: Feminisms, Postcolonialities and Modernities*. (2008)

In *Sciences from Below*, the esteemed feminist science studies scholar Sandra Harding synthesizes modernity studies with progressive tendencies in science and technology studies to suggest how scientific and technological pursuits might be more productively linked to social justice projects around the world. Harding illuminates the idea of multiple modernities as well as the major contributions of post-Kuhnian Western, feminist, and postcolonial science studies. She explains how these schools of thought can help those seeking to implement progressive social projects refine their thinking to overcome limiting ideas about what constitutes modernity and modernization, the objectivity of scientific knowledge, patriarchy, and Eurocentricity. Harding reveals how ideas about gender and colonialism frame the conventional contrast between modernity and tradition. As she has done before, in Sciences from Below, Harding points the way forward.

vi. Hird, Myra. (2009) *The Origins of Sociable Life: Evolution After Science Studies.*

> 'Myra J. Hird provides a highly engaging and energetic account of contemporary scientific debates about microbes, detailing how they challenge mainstream understandings of evolution, identity, sex and ecology. Most importantly, she articulates why social scientists, feminists and queer theorists should pay careful attention to our inextricable entanglements with the microcosmos. Her enthusiasm for her subject matter is infectious.' - Celia Roberts, Department of Sociology, Lancaster University, UK 'This book is an exciting and inviting account of the messy entanglements and inventions of the world's tiny beings, those entities that shape scale upon scale of sociable living for all on the earth. Myra Hird's book is richly researched and beautifully written, and it fulfills my appetite for an account of biology and biologists to live with and for. Hird shows how "thinking with microorganisms"-and with their scientists - can be a fundamental practice for living well in multispecies, mortal worlds.' - Donna Haraway, Distinguished Professor, History of Consciousness Department, UC Santa Cruz, USA

vii. Latour, Bruno (reissued 2008) *We have Never been Modern*

> What does it mean to be modern? What difference does the scientific method make? The difference, Latour explains, is in our careful distinctions between nature and society, between human and thing, distinctions that our benighted ancestors, in their world of alchemy, astrology, and phrenology, never made. But alongside this purifying practice that defines modernity, there exists another seemingly contrary one: the construction of systems that mix politics, science, technology, and nature. The ozone debate is such a hybrid, in Latour's analysis, as are global warming, deforestation, even the idea of black holes. As these hybrids proliferate, the prospect of keeping nature and culture in their separate mental chambers becomes overwhelming--and rather than try, Latour suggests, we should rethink our distinctions, rethink the definition and constitution of modernity itself. His book offers a new explanation of science that finally recognizes the connections between nature and culture--and so, between our culture and others, past and present.

viii. Brown, Phil (2007) *Toxic Exposures: Contested Illnesses and the Environmental Health Movement*

> The increase in environmentally induced diseases and the loosening of regulation and safety measures have inspired a massive challenge to

established ways of looking at health and the environment. Focusing specifically on breast cancer, asthma, and Gulf War-related health conditions-"contested illnesses" that have generated intense debate in the medical and political communities-Phil Brown shows how these concerns have launched an environmental health movement that has revolutionized scientific thinking and policy. Brown argues that organized social movements are crucial in recognizing and acting to combat environmental diseases. His book draws on environmental and medical sociology, environmental justice, environmental health science, and social movement studies to show how citizen-science alliances have fought to overturn dominant epidemiological paradigms.

ix. Donna J. Haraway (1997) *Modest Witness@Second Millenium. FemaleMan Meets OncoMouse: Feminism and Technoscience*

The title may prove a filing challenge, as it uses an Internet address; but Haraway presents a fine and varied probe into connections between feminism and science, examining reproductive freedom, biological approaches to race, and other issues which can contribute to a feminist, multicultural study of technoscience. College-level readers will find it different, and fascinating.

X. Netz, Reviel (2004) *Barbed Wire, An Ecology of Modernity*.

"Stunningly thought-provoking and beautifully grim in bearing witness to a larger meaning of technology, this book makes a supple use of traditional sources to discuss place and containment, with utterly novel generalizations about human economic activities and the appropriation of space." (Paul F. Starrs, author of Let the Cowboy Ride)

xi. Barad, Karen (2007) *Meeting the Universe halfway: quantum physics and the entanglement of matter and meaning*.

Meeting the Universe Halfway is an ambitious book with far-reaching implications for numerous fields in the natural sciences, social sciences, and humanities. In this volume, Karen Barad, theoretical physicist and feminist theorist, elaborates her theory of agential realism. Offering an account of the world as a whole rather than as composed of separate natural and social realms, agential realism is at once a new epistemology, ontology, and ethics. The starting point for Barad's analysis is the philosophical framework of quantum physicist Niels Bohr. Barad extends and partially revises Bohr's philosophical views in light of current scholarship in physics, science studies, and the philosophy of science as well as feminist, poststructuralist, and other critical social theories. In the

process, she significantly reworks understandings of space, time, matter, causality, agency, subjectivity, and objectivity.

XII. Shapin, Stephen (2008) *The Scientific Life: A Moral history of a late modern vocation.*

Who are scientists? What kind of people are they? What capacities and virtues are thought to stand behind their considerable authority? They are experts—indeed, highly respected experts—authorized to describe and interpret the natural world and widely trusted to help transform knowledge into power and profit. But are they morally different from other people? Conventional wisdom has long held that scientists are neither better nor worse than anyone else, that personal virtue does not necessarily accompany technical expertise, and that scientific practice is profoundly impersonal. Shapin, however, here shows how the uncertainties attending scientific research make the virtues of individual researchers intrinsic to scientific work. From the early twentieth-century origins of corporate research laboratories to the high-flying scientific entrepreneurship of the present, Shapin argues that the radical uncertainties of much contemporary science have made personal virtues *more* central to its practice than ever before, and he also reveals how radically novel aspects of late modern science have unexpectedly deep historical roots. His elegantly conceived history of the scientific career and character ultimately encourages us to reconsider the very nature of the technical and moral worlds in which we now live.

b. As you identify and analyze problems in STS you will need to communicate your results. A second skill set involves communication via:

i. Clear, well-argued and well-documented writing
ii. Clear visual presentations of high impact that can work in conjunction with
iii. Persuasive and well-defended oral arguments

c. To identify, analyze and communicate a complex problem or challenge it is essential to understand—and for the purposes of this course—document the process by which you gain the skills that form part of the course goals. This documentation of process will be accomplished via the course activities listed next.

IV. Learning goals: methods

Below are websites or papers that explore the *methods* you should think about using as you investigate your provocations. Take a little time to explore each of these websites or articles as you start on your quest. Then go back to the ones that see to you to be the most helpful and dig into them as you start to dig into your projects.

- Check out some of the articles listed on the Case Studies Bibliography (listed separately on My courses)
- http://www.demoscience.org/controversies/index.php

  This website is a resource for *Mapping Controversies* put together by some of the foremost experts and their students. Check it out!!

- Study the Knowledge-Action-Questions approach developed by Peter Taylor (listed under the Readings on My Courses)
- Clarke, Adele (2005) *Situational Analysis*. Chapters 3 and 5 (listed under the Readings on My courses)
- http://www.stinkyjournalism.org/

  (a web site that exposes bad journalism including about science)

- http://www.rpi.edu/~akeraa/Akera_projects.html

  The web site offers a visual metaphor for an ecology of knowledge, and a specific case study having to do with disciplinary formation and early 20th century development in computing. The presentation contains by Macromedia Flash (6.0) graphics to illustrate the dynamic uses of the representation. The graphics are provided below in both a narrated and un-narrated format. Check it out!

- http://www.gapminder.org/
  Unveiling the beauty of statistics for a fact based world view. This web site animates statistics in amazing ways and enables you to historicize important medical statistics, such as birth and mortality rates. Check it out.

- http://scimaps.org/
  Places & Spaces: Mapping Science is meant to inspire cross-disciplinary discussion on how to best track and communicate human activity and scientific progress on a global scale. It has two components: the physical part supports the close inspection of high quality reproductions of maps for display at conferences and education centers; the online counterpart provides links to a selected series of maps and their makers along with detailed explanations of how these maps work. The exhibit is a 10-year effort. Each year, 10 new maps are added resulting in 100 maps total in 2014.

- Singh, Ilina and Nikolas Rose (2009) “Biomarkers in Psychiatry” *Science* 460:9 pp. 202-207 [note especially the diagram onp.206]

V. Course Activities

a. Readings:

1. As a class we will choose one of the books listed above to read together and discuss in class. Please review the summaries, go on line and read some reviews and be prepared for an informed vote.
2. While we are waiting for the voted-upon book to come in, we will read some of the difficult methods papers together, specifically the Latour assigned above, and the Adele Clarke listed below.

In addition to the group reading done during the first several weeks of class, students are responsible for all of the readings listed above under Roman Number I. You should read 1-2 of the readings grouped under Arabic numerals each week so that you can complete the reading by the end of the 15 weeks. Each student can choose which readings to do in a particular week. I suggest choosing what looks like will be the biggest help in working on your current problem. Using the Discussion Group feature of My Courses, comment to your colleagues each week about what you have read **(these weekly entries are required)**.

b. On line writing entries

Using the Class Discussion feature of My Courses, you are required to document your own intellectual discoveries and development in a way that provokes response and discussion from others. Your entries do not have to be long, but they should be thoughtful, addressing something that you have learned, something that fascinates you and or something you don't understand and for which you seek clarification. Others in the class will, hopefully, respond to these entries and the entire exercise will extend discussion to the late night venue as well as the in class times. Although informal, I will pay attention to the clarity of writing and I may respond either publicly or privately, as is appropriate. My assessment of the quality of the journal will form part of your grade.

c. Problems/Provocations:

Since this course uses problem based learning (see: http://en.wikipedia.org/wiki/Problem-based_learning) we have to have problems to investigate. We will do four problems during the semester using the following process.

1. I will offer several sets of short articles or papers each of which I am calling a provocation. Each set pertains to a particular topic, e.g. “science policy”, or “the public understanding of science”. These will be available on My Courses.
2. During one class (or during the week in between) the class will vote on which provocation to take as its problem text. There is only time to investigate 3 or the 4 sets, so you will be making a big cut (which topic to omit) and then a smaller cut (which article to focus on within a particular set).
3. The next class will be devoted to individual presentations that map the issues, actors and knowledge questions identified (See the Methods papers and websites for help). After the individual work, we will form subgroups with common questions or interests and during the next one to two weeks you will work on **a presentation** that (a) shows the science in action, maps the actor networks, or social worlds or narrative connections (b) identifies unanswered questions and (c) proposes an action, perhaps one that might surprise you or us, but that is based in your analysis of the provocation.
4. At the end of each provocation report, the group will submit via a document attached to the discussion section, **an annotated bibliography of readings that helped them progress in their project.** I will compile these into a complete annotated bibliography which will be one of the products produced by the entire class. I will also post reading lists of possible interest on the web site, as readings occur to me.

d. Class attendance and participation:

It should go without saying that you have to attend class and participate actively, both in our problem solving and by offering points of view and information gleaned from your weekly readings. Quality counts even more than quantity in my assessment of this component of your work. Quality means not only that you have thought about what you have to say before you say it, that you bring to the classroom the work you have done during the preceding week, but also that you listen attentively to your classmates and respond thoughtfully to their contributions. Should there be a legitimate reason (e.g. illness or other crisis) for you to miss class you must (a) let me know, in advance if at all possible and (b) if you miss more than one class, ask a dean to be in touch with me about your reasons for missing.

VI. Role of the instructor

My role will be as a consultant. I will send you references that I think may help; I will respond to comments and questions posted on the discussion pages of my courses. In general, I will try to guide your learning and exploration process. Sometimes this may be via direct knowledge transfer (i.e. I will tell you something that I know from my own studies); most often, it will be by asking crucial questions, pointing you towards resources that should help you figure out what you

want to know and at times joining you as we look something up and try, together, to figure out what it means.

One way in which I can (and will) guide your learning is by regular evaluation. First, note the goals I set at the start of this document. These are divided into CONTENT and specified with particular readings that you need to have done and reflected upon before the end of the semester; and into SKILLS (including analysis and various forms of communication). I will assess your progress in these areas during the semester by noting your in class contributions as well as your on line and in class contributions to the discussions and evaluating your more formal class presentations

Here are some of the skills I will look for:

1. Identify, summarize, and reformulate problem, question, issue
2. Identify and consider importance of context and underlying assumptions
3. Develop and communicate your own perspective, hypothesis or position
4. Assess and analyze supporting and contradictory data/evidence
5. Integrate a variety of disciplinary perspectives and positions
6. Identify and assess conclusions, implications and consequences
7. Communicate your results effectively and with clear audience identification
8. Work Effectively in a work group—i.e. pull your own weight, listen to others, compromise but also lead.

Here are some of the skill levels I will evaluate:

1. In general, each student will start at different levels for each of the above skills. I will consider you as emerging, developing or having mastered the above skills and during the semester I will look for progress in each area.
2. “Emerging” is a polite way of saying you are a total beginner. That ought not to be the case for most of you, since you are seniors and have been developing skills in college for 3 years.
3. “Developing” suggests that you have the outlines of each of these skills but you still have a way to go. E.g. a “developing” communicator uses language pretty well, errors are infrequent but there are still problems of style, voice and audience. Basic organization is visible but format can be inconsistent, and most of the time sources are cited and used correctly.
4. A “Master” communicator means you are ready for graduate school, to excel at a job and to be a brilliant political actor. Your language use is nuanced and eloquent; minimal errors and appropriate style for the audience of choice; clear organization; correct source citation.

V. Weekly Syllabus

Class Meeting
Times

VI. Problems: you can find the problems posted separately under “Problems” on My Courses.

Case Studies Bibliography

In STS a common method for illuminating a problem or answering a question is to produce a case study. Case studies are often structured around, and are intended to reflect upon, one or more theoretical perspectives. You may find this a useful approach in working on your problems. The following articles (available on My Courses) present particular case studies: I recommend reading some of them (you choose) so that you can “get the idea” of what approaches I expect in your presentations (even though these need not be in the format of a formal academic article).

1. Goedeke, T.L. and S. Rikoon (2008) “Otters as Actors: scientific controversy, dynamism of networks, and the implications of power in ecological restoration.” *Social Studies of Science* 38:1 pp 111-132.

2. Kruger, E., Magnet, S. and J. Van Loon (2008) “Biometric revisions of the ‘body’ in airports and US welfare reform”. *Body and Society* 14 (2): 99-121

3. Konopasek, Z, Stockelova, T. and Zamykalova, L. (2008) “Making pure science and pure politics: on the expertise of bypass and the bypass of expertise”. *Science, Technology and Human Values* 33:4. pp 529-553.

4. Taylor, Peter (2009) “Infrastructure and Scaffolding:Interpretation and Change of Research Involving Human Genetic Information”. *Science as Culture* in press. (Available on My Courses)