

Governing Emerging Technologies POS 598 (80539)

T/Th 1:30-2:45 pm

LL 105

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Hours: W 10-12 or by arrangement

Discussions of science and technology policy (STP) often get lost in the thicket of debates over research funding, or in intellectually unsatisfying explorations of the technical areas or social interests that underlie STP. This seminar seeks to expand the scope of STP theory, research, and practice to include broader aspects of governance, through a focus on emerging technologies whose potential global consequences are apparent only in anticipation and whose manifestations are still being shaped by local, domestic, and international institutions. These emerging technologies include nanotechnologies, synthetic biology and other technologies associated with genetic modification, and information and cognitive science and neuro-technologies (together these technologies are often known as “NBIC” or converging technologies because they increasingly use the same techniques, tools, materials, and operate on the same scale).

The seminar begins by introducing the concept of governance to this understanding of emergence. Governance is a capacity that includes a variety of responses to societal challenges, ranging from complete *laissez faire* to highly interventionist approaches, but distributed across civil society and not necessarily lodged in public institutions (government). To thematize the focus on governance of emerging technologies, this seminar will pattern its inquiry after the research programs of the Center for Nanotechnology in Society (CNS) at ASU. First, it will examine a suite of “real-time technology assessment” tools for understanding emerging technologies, and then it will locate that understanding in three strategic areas of inquiry: 1) **anticipation or foresight** of the kinds of transformations these technologies may create; 2) **engagement** with various publics over the values that underpin work on these technologies; 3) **integration** of social science and humanist inquiry with scientific and technical work in these areas.

The class will be taught as a seminar, meaning that students in it will have a major role in the classroom dynamic by presenting and discussing material – and so it is crucial to attend class, perform readings (most of which will be available on Blackboard), and prepare assignments thoroughly and on time. The class will also be a research seminar, meaning that it will emphasize a variety of research perspectives and techniques to familiarize students with the ensemble of tools that must be used to get a robust understanding of and potential governance perspective on emerging technologies. These techniques can be applied in the context of the required research paper (see below), as well as explored in greater depth for program or thesis requirements. Students will further be encouraged (and perhaps occasionally required) to participate in co-curricular activities related to the activities of CNS-ASU.

The major assignment for the class is a research paper on a governance issue of an emerging technology. A discussion of the expectations for the research paper is appended to this syllabus.

The complete schedule of assignments is below:

<u>Assignment</u>	<u>% Grade</u>	<u>Due Date</u>
Attendance and Participation	20%	Ongoing
Acronym	5%	2 September
Presentation of research program	5%	11 September
VantagePoint project	5%	23 September
Survey project	5%	2 October
Research paper topics	--	2 October
Participation project	5%	14 October
Annotated Bibliography	5%	16 October
Engagement project	5%	21 October
Anticipation project	5%	28 October
Integration project	5%	6 November
Preliminary presentations of research	5%	13 November
Presentations of draft research papers	10%	2/4/9 December
<u>Final research paper</u>	<u>25%</u>	<u>12 December</u>
	105%	

(You may opt out of one 5% project – except the 5% components of the research paper – or do all of them for 5% extra credit.)

(1) T Aug 26: Introductions, Overview of Syllabus, Etc.

Th Aug 28: Governance

- Rhodes, R.A.W. 1996. "The New Governance: Governing without Government." *Political Studies* 44:652-67.
- Stoker, Gerry. 1998. "Governance as Theory: Five Propositions." *International Social Science Journal* 50(155):17-28.

(2) T Sep 2: Emerging Technologies

- Hoffman, B., J.H. Solbakk, and S. Holm. 2006. "Analogical Reasoning in Handling Emerging Technologies: The Case of Umbilical Cord Blood Biobanking." *American Journal of Bioethics* 6(6):49-57.
- Roco, M.C. 2006. "Progress in Governance of Converging Technologies Integrated from the Nanoscale." *Annals of the New York Academy of Sciences* 1093:1-23.
- Browse <http://www.nisenet.org/>, particularly "Catalogue."

Th Sep 4: Anticipatory Governance

- D. H. Guston and D. Sarewitz. 2002. "Real-Time Technology Assessment." *Technology in Society* 24:93-109
- Karinen, R. and D. H. Guston. Under review. "Toward Anticipatory Governance." in *Deliberating Future Technologies: Identity, Ethics, and Governance of Nanotechnology*. Kaiser, M.; S. Maasen; and C. Rehmann-Sutter (eds.)
- Barben, D.; E. Fisher; C. Selin; and D. Guston. 2008. "Anticipatory Governance of Nanotechnology: Foresight, Engagement, and Integration." in *The Handbook of Science and Technology Studies, Third Edition*. Hackett, E.J.; O. Amsterdamska; M.E. Lynch; and J. Wajcman (eds.) Cambridge, MA: MIT Press.

(3) T Sep 9: The Center for Nanotechnology in Society at ASU

- D.H. Guston et al. 2005. NSEC: Center for Nanotechnology in Society. Executive Summary. Available at <http://cns.asu.edu/cns-library/documents/ExecSum.pdf>
- D.H. Guston et al. 2005. NSEC: Center for Nanotechnology in Society. Project Description. Available at <http://cns.asu.edu/cns-library/documents/Description.pdf>
- D.H. Guston et al. 2005. NSEC: Center for Nanotechnology in Society. Bibliography. Available at <http://cns.asu.edu/cns-library/documents/references.pdf>
- D. H. Guston. 2007. "The Center for Nanotechnology in Society at Arizona State University and the Prospects for Anticipatory Governance." Pp. 377-92 in N. Cameron and M. Ellen Mitchell, eds., *Nanoscale: Issues and Perspectives for the Nano Century*. New York: John Wiley and Sons.
- CNS-ASU. 2008. *The Center for Nanotechnology in Society at Arizona State University: Annual Report for the Period October 1, 2007 to September 30, 2008*. Tempe, AZ: CNS-ASU. Available at <http://cns.asu.edu/cns-library/documents/cnsasuYR3annualreport.pdf>

Th Sep 11: Student Presentations, I: Formal Studies of Emerging Technologies

No readings for today. Students will present brief write-ups of other research centers or groups they have identified who work on the governance of emerging technologies. See assignment sheet for details.

(4) T Sep 16: Characterizing the Research Enterprise

Porter, A.L., J. Youtie, P. Shapira, and D. Schoeneck. 2008. "Refining Search Terms for Nanotechnology." *Journal of Nanoparticle Research*. 10:715-728.
Youtie, J.; M. Iacopetta; S. Graham. 2008. "Assessing the Nature of Nanotechnology: Can We Uncover an Emerging General Purpose Technology?" *Journal of Technology Transfer*. 33:315-329.

Th Sep 18: Skills, I: Bibliometrics, VantagePoint and Data mining

Youtie, J.; P. Shapira; and A. Porter. 2008. "National Nanotechnology Publications and Citations." *Journal of Nanoparticle Research*. Online at DOI 10.1007/s11051-008-9360-9 (forthcoming in print).
Shapira, P. and J. Youtie. 2008, forthcoming. "Emergence of Nanodistricts in the United States: Path Dependence or New Opportunities?" *Economic Development Quarterly*. 22(3).
Guest tutor: Mark Neff

(5) T Sep 23: Characterizing Public Opinion & Values

Lee, C.J., D.A. Scheufele and B.V. Lewenstein. 2005. "Public Attitudes Toward Emerging Technologies: Examining the Interactive Effects of Cognition and Affect on Public Attitudes Toward Nanotechnology." *Science Communication* 27(2):240-67.
Scheufele, D.A.; E.A. Corley; S. Dunwoody; T-J Shih; E. Hillback; and D.H. Guston. 2007. "Nanotechnology Scientists Worry about Some Risks More than the General Public" *Nature Nanotechnology*. 2(12): 732-734.
Brossard, D., D.A. Scheufele, E. Kim, and B.V. Lewenstein. Forthcoming. "Religiosity as a Perceptual Filter: Examining Processes of Opinion Formation about Nanotechnology." *Public Understanding of Science*.

Th Sep 25: Skills, II: Surveys and Media Studies

(6) T Sep 30: Guston not in class – Rosh Hashanah

Students who are able to come to class today should meet independently and discuss their research paper topics and/or their public opinion assignments.

Th Oct 2: Engaging Publics

D. H. Guston. 1999. "Evaluating the First U.S. Consensus Conference: The Impact of the 'Citizens' Panel on Telecommunications and the Future of Democracy.'" *Science, Technology & Human Values* 24(4):451-82.

Rogers-Hayden, T. and N. Pidgeon. 2005. "Reflecting Upon the UK Citizens' Jury on Nanotechnologies: *NanoJury UK*." *Journal of Nanotechnology Law and Business* 3: 167-78. Available at

<http://heinonline.org/HOL/Page?collection=journals&handle=hein.journals/nantechlb3&div=26&size=2&rot=0&type=image>

(7) T Oct 7: Skills, III: Participatory Mechanisms

CNS-ASU National Citizens' Technology Forum Background Document. Available at ??

CNS-ASU National Citizens' Technology Forum Final Reports. Available at

http://www4.ncsu.edu/~pwhmds/final_reports.html

CNS-ASU National Citizens' Technology Forum Final Report. Available at ??

Th Oct 9: Guston not in class – Yom Kippur

(8) T Oct 14: Engagement/Exercise

Th Oct 16: Anticipation and Foresight:

Fleischer, T., M. Decker and U. Fiedler. 2005. "Assessing Emerging Technologies: Methodological Challenges and the Case of Nanotechnologies." *Technological Forecasting and Social Change* 72: 1112-21.

Halal, W.E., M.D. Kull and A. Leffman. 1998. "The George Washington University Forecast of Emerging Technologies." *Technological Forecasting and Social Change* 59: 89-110.

(9) T Oct 21: Anticipation and Foresight

Selin, C. 2008. "The Future of Medical Diagnostics" *CNS-ASU Working Paper*. May 2008.

Rip, A. and te Kulve, Haico. 2008. "Constructive Technology Assessment and Socio-Technical Scenarios." Pp. 49-70 in E. Fisher, C. Selin, and J.M. Wetmore, eds., *The Yearbook of Nanotechnology in Society, Volume 1: Presenting Futures*. D.H. Guston, series ed. New York: Springer.

(CNS Visioning Workshop: Wed 22 Oct 1-6 pm; Thur 23 Oct 8:30 am – 4 pm)

Th Oct 23: Exercise: Scenario Development

Bennett, I. 2008. "Developing Plausible Nano-Enabled Products." Pp. 149-56 in E. Fisher, C. Selin, and J.M. Wetmore, eds., *The Yearbook of Nanotechnology in Society, Volume 1: Presenting Futures*. D.H. Guston, series ed. New York: Springer.

Selin, C. 2008, forthcoming. "Negotiating Plausibility: Intervening in the Future of Nanotechnology." *Science and Engineering Ethics*.

Nanofutures: <http://cns.asu.edu/nanofutures/>

(10) T Oct 28: Integration

Fisher, E. 2007. "Ethnographic Invention: Probing the Capacity of Laboratory Decisions"
NanoEthics. 1(2): 155-165.

Doubleday, R. 2007b. "The laboratory revisited: academic science and the responsible
governance of nanotechnology" *NanoEthics*. 1(2):167-176.

Th Oct 30: Exercise: Interviewing Scientists

NSF Proposal: Socio-Technical Integration Research (STIR)

(11) T Nov 4: Panel on Integration

Guest panelists: Cynthia Selin, Erik Fisher, Dave Conz

Th Nov 6: Spill-Over Day

(12) T Nov 11 – no class: Veterans Day

Th Nov 13: Preliminary Presentations

No readings for today, but students will make brief informal presentation of their
progress to date on their research papers.

(13) T Nov 18

Student-derived topic to be determined.

Th Nov 20

Student-derived topic to be determined.

(14) T Nov 25

Student-derived topic to be determined.

Th Nov 27 – no class: Thanksgiving

(15) T Dec 2 : Student Presentations

Th Dec 4 : Student Presentations

(16) T Dec 9: Student Presentations

F Dec 12 – Research Paper Due

About the Research Paper

The course requires all students to write a research paper on an issue or case in the governance of emerging technologies. The paper should make some use of a method, framework, or empirical material from the course, but it should be an independent and original application of that material to something from outside of class that you have researched independently. (For HSD students this paper is an excellent preparation for your required second year paper!)

The paper should be approximately 15-18 double-spaced pages (4000-5000 words; exclusive of notes and references). This length will require you to do both significant research (to achieve that length) and significant editing (to present something clear and coherent within that length). If you are merely describing things that you have read, you will likely go well over the word limit. You should be able to introduce the material and an analytical framework for addressing it in, say, 500 – 750 words; conclude in 500 – 750 words; and spend 3000-4000 words describing and analyzing what you've researched.

All research papers should properly reference their source material. Thus, you must hand in a preliminary annotated bibliography (of at least 10 items from multiple types of sources). You should use this syllabus as a model for how to write out a bibliographic reference. The basic requirements are that all information must be complete and consistent, enabling your reader to easily identify and track down the source material. To annotate a bibliography, write approximately 50-100 words to summarize the item (its topic, method, relevance to your research topic, etc.) after it, before moving on to the next (alphabetically listed) item. The annotated bibliography should demonstrate a familiarity with a variety of sources, e.g., peer-reviewed journal articles, books, government documents, press accounts, web sites, etc.

Appropriate attribution of material is critical in all academic writing. General guidelines include:

- If the text you are writing has 3 or more important words consecutively taken from a source, you must use quotation marks around that text AND cite that source and its page number.
- If the text you are writing makes a specific and not commonly known point that is derived from a source, you must cite that source. Paraphrasing, no matter what the source (even government documents), requires citation.
- If the text you are citing makes a point, even a specific one, that is commonly known (e.g., if you could find that same point in at least several different sources), you do not need to cite that source. But you still must cite the source if you are using its own language rather than your own to make the point.

There are two important reasons for rules of attribution. One is, again, to help your reader find anything he or she might want to pursue in greater detail. The other is to give credit where credit is due. Just because something is on the web or “in public domain” does not relieve the responsibility of providing appropriate attribution. Attribution is NOT about the legalities of copyright – it is about the integrity of scholarship.

With regard to style and grammar, your writing should, above all, be clear and correct. Aim for clarity first and elegance later. If you have questions about grammar and style, please consult the Writing Center, which has a set of handouts that are very helpful (<http://www.asu.edu/duas/wcenter/handouts.html>). You should be absolutely sure to proofread your final version at least twice – do not rely on your word processor’s spell check, as there is more to good grammar and good style (and, indeed, good spelling) than spell check. But please use the spell check, with the grammar check turned on, because it will help you identify sentences that may need some work.

The paper should follow general conventions of formatting (double-spaced, paginated, left-justified, 12-point serif font, 1” to 1.25” margins).

The in-class presentations should be clear and informative about your research. You should plan on using PPT as that is fully conventional in research presentations now. But your effort should go into making the presentation interesting and understandable to the class, not making it pretty to look at. The length of the presentation will depend on the number of students in the class, but you should plan on allowing plenty of time for questions from me and your colleagues.