

PUBP 820 SYLLABUS
Technology/Science/Public Policy
Fall 2003

Location: Krug Hall, #209
Instructor: Don E. Kash
Phone: (703) 993-2279

Time: Wednesday 4:30 PM - 7:10 PM
Office: 215 Finley Building
Email: dkash@gmu.edu

Course Description

This seminar is the first half of a two-semester sequence required of students in SPP's Science and Technology Policy concentration. In this seminar, students will read and investigate a broad body of literature relevant to science and technology policy. During the second semester, students will prepare a research paper on a science or technology policy issue or problem with the goal of publishing that paper.

The readings in this seminar are designed to provide an overview that ranges from investigations of what science and technology are and how they are done, to investigations of how science and technology policy is handled in government. As students proceed through the seminar, they should look for a topic that can be the focus of their second semester paper. During the second semester, students will be required to do a research paper in an area of science and technology policy that is different than the area or areas within which they presently work or within which they have recently worked. Students during the second semester must move out of the areas where they already have established competence.

This seminar rests on the assumption that science and technology have become major causal forces in contemporary society. Few important areas of public policy are now free of the influence if not the dominance of our increasing ability to understand and manipulate nature through science and technology. Our goal is to gain some insight into the triangle of nature/man/science and technology and what that set of interconnections means for both the formulation of public policy and the ability to accomplish public goals through policy.

At the most general level, public policy can be the product of or influenced by four interacting factors:

- 1) Science and technology,
- 2) Institutions,
- 3) Culture/values/ideology, and
- 4) Individuals.

First, the ever-advancing frontier of science and technology establishes the boundaries of many public policy issues and problems and the tangible options for addressing those issues and problems. Technology creates many issues, e.g., toxic wastes. Science discovers many issues, e.g., asbestos. Science and technology, through the use of existing knowledge or capability or through R&D aimed at discovering new ways of dealing with issues, provide a diverse set of policy instruments. Thus, one of the goals of this seminar should be to gain some understanding of how science and technology evolve, that is how these activities are developed and used.

Second, policy is influenced by the institutional structure of the policy system. In the U.S. that structure is bounded, in part, by the Constitution. The structure, however, also includes the complex set of special interest policy systems, often technology based, which link the executive and legislative branches of the federal government with the state governments, the private sector, and the university and non-profit sectors. One special interest policy system has been assembled around science. There are many special interest policy systems for technology. They are focused on specific areas, e.g., agriculture, defense, highways.

Third, policy is influenced by culture/values/ideology. Here it seems useful to use culture in the sense of values and social reference systems, the norms that tell people and societies both what are right and acceptable and more broadly how social systems work. Societies, at least what we would call successful societies, have conceptual models, which tell them how society works, and thus what is wrong when they do not work. These conceptual systems normally blur the line between fact and value. In the United States the distinction between the public and private sectors flows from such a conceptual model. At any point in time culture/values/ideology bound both policy making and policy options and influence how we develop and use science and technology.

Fourth, exceptional individuals sometimes influence policy. This factor is clearly the least predictable in terms of both policymaking and policy options. It is useful to note that inside the beltway in Washington it is common to explain events in terms of individuals, e.g., Senator X wanted this. Alternatively, the social sciences seldom explain policy in terms of individuals; rather they go for more general explanations, e.g., interest group competition, campaign contributions. In this seminar we want to look at the interplay of these four factors as they relate to the general role of science and technology in the American policy system.

In the following, the readings for the seminar are broken down by class date. Each seminar participant will be expected to have read all the materials for the session in advance. At the beginning of each seminar session, students will be required to submit a two to three page summary of what they have read for that session. Specifically, the goal is to summarize in these two to three pages the major points or themes of the material to be discussed in the seminar. It is important to emphasize that the summaries are not critiques. Students are to indicate what the authors have to say, not what the students think of the readings.

During the seminar sessions, students will be asked to present reviews of books, which represent investigations of the relationship between public policy and some area of science and technology. The students are asked to select the books for this review in consultation with the instructor.

Grade

Your grade will be determined 80% by a final exam and 20% by participation in class discussion.

Required Books

Dupree, A., Hunter, Science in the Federal Government: A History of Policies and Activities, Baltimore: Johns Hopkins University Press, 1985.

Greenberg, Daniel, S., Science, Money and Politics: Political Triumph and Ethical Erosion, Chicago: University Chicago Press, 2001.

Kuhn, Thomas, S., The Structure of Scientific Revolutions, University of Chicago Press, 1962.

Mowery, David, C. & Nathan Rosenberg, Paths of Innovation: Technical Change in 20th Century America, Cambridge, UK: Cambridge University Press, 1998.

Rycroft, Robert, W. and Don E. Kash, The Complexity Challenge: Technological Innovation for the 21st Century, London: Pinter, 1999.

Waldrop, M., Mitchell, Complexity: The Emerging Science at the Edge of Order and Change, New York: Simon and Schuster, 1992.

Watson, James, D., The Double Helix, New York: Atheneum, 1968.

White, Lynn, Jr., Medieval Technology and Social Change, New York: Oxford University Press, 1966.

Course Outline

WEEK 1: August 27

I. Overview Lecture: What does science and technology policy refer to?

Start with the system which links science (the understanding of nature) to technology (the manipulation of nature). Provide an overview of science, an overview of technology and how they link. Sketch their interaction in the contemporary period: linear, chain-linked. Discuss the science policy system and the multiple technology policy systems: defense, medicine, transport, etc...

WEEK 2: September 3

II. What is science and how is it done?

1. Ernst Cassirer, "Galileo: A New Science and A New Spirit," The American Scholar, Vol. 12, No. 1, (Winter 1942-43), pp. 5-19.
2. Thomas S. Kuhn, The Structure of Scientific Revolutions, University of Chicago Press, 1962.
3. James D. Watson, The Double Helix, New York: Atheneum, 1968.

WEEK 3: September 10

III. The Scientific Community and its Relationship to Technology

1. Hendrik W. Bode, "Reflections on the Relation between Science and Technology," in Basic Research and National Goals, A Report to The Committee on Science and Astronautics, U. S. House of Representatives by The National Academy of Sciences, March 1965, pp. 41-76.
2. Joseph Ben-David, "Scientific Growth: A Sociological View" Minerva, 2, 1963-64, pp. 455-476.
3. Robert Merton, "The Matthew Effect in Science," Science, 159, (1968), pp. 56-63.
4. Derek J. de Solla Price, Little Science Big Science, New York: Columbia University Press, 1963. {Hand out}, pp. 1-33.
5. Robert Merton, "Behavior Patterns of Scientists," American Scholar, 38, 1969, pp. 197-225.
6. Joseph Ben David and Awraham Zloczower, "Universities and Academic Systems in Modern Societies," in Norman Kaplan, ed., Science and Society, Chicago: Rand McNally, 1965, pp. 62-85.

WEEK 4: September 17

IV. Technology and Social Change

7. Lynn White, Jr., Medieval Technology and Social Change, New York: Oxford University Press, 1966.
8. Chris Freeman and Luc Soete, The Economics of Industrial Innovation, London: Pinter, 1997, p. 1-54.

WEEK 5: September 24

V. New Conceptual Approaches

1. M. Mitchell Waldrop, Complexity: The Emerging Science At The Edge Of Order and Chaos, New York: Simon and Schuster, 1992.
2. Trevor J. Pinch and Wiebe E. Bijker. "The Social Construction of Facts and Artifacts."

WEEK 6: October 1

VI. The Nature of Technological Innovation

1. Walter Vincenti, "Technological Knowledge Without Science: The Invention of Flush Riveting in American Airplanes, circa 1930-1950," Technology and Culture, vol. 25, 1984, pp. 540-576.

2. Stephen J. Kline, "Innovation Styles in Japan and the United States: Cultural Bases; Implications for Competitiveness," Department of Mechanical Engineering, Stanford University, Ca., Report INN-3.
3. Fumio Kodama, "The Power of Technology Fusion," Typescript.
4. William Kingston, "Antibiotics, Invention and Innovation," Research Policy, vol. 29, 2000, pp. 679-710.

WEEK 7: October 8

VII. Examples of Innovation

1. Mowery, David, C. & Nathan Rosenberg, Paths of Innovation: Technical Change in 20th Century America, Cambridge, UK: Cambridge University Press, 1998.

WEEK 8: October 15

VIII. Innovation of Complex Technologies

2. Robert W. Rycroft & Don E. Kash. The Complexity Challenge, London: Pinter, 1999.

WEEK 9: October 22

IX. The Science and Technology Policy System. To WWII

1. A. Hunter Dupree, Science in the Federal Government: A History of Policies and Activities, Baltimore: Johns Hopkins University Press, 1985.

WEEK 10: October 29

X. Science, Technology and the Institutions of Government and Society.

A. Overview

1. Bruce C. R. Smith, American Science Policy Since WWII, pp.1-158.
2. Otis L. Graham, Jr., Losing Time: The Industrial Policy Debate, Cambridge, Mass.: Harvard University Press, 1992, pp. 171-206. 2. Don E. Kash, Perpetual Innovation: The New World of Competition, New York: Basic Books, 1989, pp. 83-103.

WEEK 11: November 5

XI. Science and Technology Politics

1. Greenberg, Daniel, S., Science, Money and Politics: Political Triumph and Ethical Erosion, Chicago: University Chicago Press, 2001.

WEEK 12: November 12

XII. Other Nations Policies

1. To be Added

WEEK 13: November 19

Student book reviews

WEEK 14: December 3

Student book reviews

FINAL EXAM: To Be Arranged