SCHOOL OF COMPUTATIONAL SCIENCES FALL 2006

CSI 638 The Policy Process for Scientists (Space Weather & Meteorology)

TENTATIVE SYLLABUS

Credit Hours: 2

Location: East Building 134
Time: Thursday 5:00-7:00 PM
Instructors: Dr. Genene Fisher (fisher@ametsoc.org, 202-737-9006 x422) and
Dr. Art Poland (apoland@gmu.edu, 703-993-8404)
Office Hours: Usually available 1 hour before class. Also available by appointment.

Description

This course is designed for science students who are interested in the relationship between government and science/scientists and the issues and processes that shape science policy. Students will gain a better understanding of how public policy can influence science/scientists and how science/scientists can influence public policy. The course is aimed primarily at graduate students with a background or interest in the space weather and meteorological fields, however, it should be useful for other scientists interested in government and policy. The relationships between scientists and various government agencies will be discussed. This course assumes the student has taken no prior courses in policy.

Objectives

- Understand the relationship between science and policy
- Explore examples of how public policy can influence science/scientists and how science/scientists can influence public policy
- Develop tools to effectively interact with the government in the policy process
- Discuss policy issues facing the space weather and meteorological fields

Format

The course will be a weekly 2-hour seminar. Each class will revolve around discussion on reading materials. The required readings for the course are all available on the Internet, except case studies and other readings that will be handed out. Each class, assigned students will be responsible for summarizing main points of the readings at the beginning of the discussion. The course will also involve several guest lecturers (including people who have worked at high levels in government agencies), which may modify the schedule. Also, based on the interests of the students, the topics may vary towards the end of the semester.

Students will be responsible for three 1-2 page briefing memos presenting a science or technology policy issue, policy recommendations, and the reasoning behind them to an appropriate policy maker. It should be written as if you are either a congressional staff member writing to your boss, who is a Member of Congress; or as a staff member in an agency writing for your boss, who is a policy-level appointee. More information about potential topics and how to write a briefing memo will be provided in class. There will also be a midterm and final exam.

Grading/Requirements

Grading will depend on class participation (30%), three memos (30%), midterm (15%) and final (15%). Students will be expected to have read the material assigned for each session in advance of class. Participation includes attendance and actively contributing to the class discussion of readings. The first memo is due **September 27**, the second is due **October 25**, and the final one is due **November 29**. The Midterm is scheduled for **October 18** and the final is scheduled for **December 13**.

1. Introduction/overview: What is science policy? (Aug 30)

The first class will introduce the course and go over the syllabus. We will discuss what is meant by "science policy" and why it is important. We will discuss the framework and tools for policy analysis. This class will give an overview of the importance of science and technology to the nation, past contributions, and future challenges. This class will set the stage for the course, which will go into more detail.

Main points: 1) what is science policy; 2) why is science policy important; and 3) framework for policy studies

Sources for this discussion will come from *Agendas, Alternatives, and Public Policies* by John Kingdon, and recent news articles

2. Science Policy in the Federal government: past and present (Sept 6)

This class will discuss the relationships between science/technology and government and how they have changed over time since WWII. Concepts in *Pasteur's Quadrant* will be discussed (basic, applied, use-inspired research). We will discuss how the support for research evolved. We will discuss the relationship between science and social policies and the need for a federal role in science education.

Main points: 1) understanding of how the federal government and science evolved since WWII; 2) understanding of main points from Vannevar Bush Report and Ehlers Report

Sources for this discussion will come from *Pasteur's Quadrant, Science—the Endless Frontier (V. Bush), Unlocking our Future: Toward a New National Science Policy (Ehler's Report),* and *NSF Science and Engineering Indicators*

Students should read: *Science—the Endless Frontier, Ch 1, 3, 4, 6*
Unlocking our Future: Toward a New National Science Policy, Parts I & II

3. Who makes science policy and how is it made? (Sept 13)

This class will discuss the various institutions that are involved in making policy as it relates to R&D (federal agencies, labs, congress, industry, universities, etc.)

Main points: 1) who is involved in science policy; 2) how is policy made

Sources for this discussion will come from *Unlocking our Future: Toward a New National Science Policy; Agendas, Alternatives, and Public Policies; and American Science Policy Since WWII*

Students should read: *Unlocking our Future: Toward a New National Science Policy,* Parts III, IV and V

4. Interactions between scientists and the federal government (Sept 20)

This class will discuss various ways scientists get involved with the government, including setting priorities with funding agencies, NAS advisory boards, working for federal agencies or congressional offices, and participating in professional societies. This class will discuss the role of universities in science policy. Supply and demand of science professionals, conflicting demands on faculty due to research, federal policies on campus, export controls, tech transfer, ethics, etc.

Main points: 1) How scientists get involved with the government; 2) How scientists can influence policy

Sources for this discussion will come from handouts
Students should read: handouts

"National Academies Committee Sets Steps for Bringing Best Science Advice to Washington," Physics Today, February 2005
"The Sciences' Way of Politicking," Science, Money, and Politics, D.S. Greenberg
"17 Cardinal Rules for Working with Congress," W. G. Wells Jr.

5. Policy Memo Discussion (Sept 27)

Due: 1st memo
Students will summarize their policy issues and defend their position to the rest of the class.

6. Funding R&D (Oct 4)

Guest Lecture: TBD

This class will give an overview of the federal budget and legislation process. We will discuss the breakdown of funds by field and by sector.

Main points: 1) what is the federal R&D budget; 2) how does the funding process work

Sources for this discussion will come from AAAS R&D publications, *NSF Science and Engineering Indicators*
Students should read: handouts

Teich, A. and K. Koizumi, 2004: An introduction to R&D in the FY 2005 budget, chapter I in AAAS Report XXIX: Research and Development FY 2005.
"Caught in the Squeeze," Science, Vol 307, page 832-834, February 11, 2005

7. Policy Issues in Space Weather and Meteorology, Part I (Oct 11)

This class will review current policy issues in the field of space weather: public-private sector partnership, economic and societal impacts, research to operations, interagency coordination, etc.

This class will focus on public-private sector partnership issues. Public versus private goods will be discussed. Most examples will come from meteorology, but discussion on the nascent space weather partnership will be included.

Main points: 1) the public private sector partnership issue, 2) public versus private goods
Sources for this discussion will come from NRC *Fair Weather* report and *Global Public Goods*
Students should read: handouts

Sources for this discussion will come from handouts, NRC *Fair Weather* Report

Students should read: handouts,
Fisher, G., "Challenges Facing the Space Weather Public-Private Sector Partnership," *Space Weather, 2,* 2004
Fisher, G., "Lessons From the U.S. Meteorological Public-Private Sector Services Partnership," *Space Weather, 2,* 2004
Fisher, G.M., "Integrating Space Weather and Meteorological Products for Aviation," *Bulletin of the AMS*,84,1519–23, 2003.
Lanzerotti, L.J., "Space Weather Effects on Technologies," *Space Weather*, AGU monograph *125,2001*.

8. Science and politics, Case Study: Polar Cap Observatory (Oct 18)

Midterm

This class will discuss the relationship between science and politics and how they can both influence each other. Focus will be on a case study on the Polar Cap Observatory.

Main points: 1) How politics and science can intersect; 2) lessons learned

Sources for this discussion will come from PCO case study, legislation, and articles

Students should read: handouts
Case Study: The Polar Cap Observatory
"Science, Politics, and US Democracy," Issues in Science and Technology, Fall 2004.
"Clinton, Atom Smashing, and Space," Science, Money, and Politics, D.S. Greenberg.

9. Case study: The National Space Weather Program (Oct 25)

Guest lecture: Dr. Rich Behnke, Upper Atmosphere Research Section, NSF

This class will discuss the NSWP. Main points: 1) What is involved in getting an interagency program started; 2) lessons learned
Students should read: *The U.S. National Space Weather Program: A Retrospective* (AGU monograph 125, Space Weather, 2001)

10. 2nd Policy Memo Discussion (Nov 1)

Due: 2nd memo
Students will summarize their policy issues and defend their position to the rest of the class.

11. Scientists working in the Executive and Legislative Branches (Nov 8)

Guest lecture: TBD

This class will also discuss some international issues facing the space weather and meteorological fields. We will discuss big vs small science, data sharing, ITAR, and other issues.

12. Policy Issues in Space Weather and Meteorology, Part II (Nov 15)

This class will explore how we measure the economic impacts of research. Should it be a basis for deciding on national investments in research? The class will use examples from the fields of meteorology and space weather. We will discuss emerging policy issues in these fields.

Main points: 1) understand some of the societal and economic impacts in meteorology and space weather, 2) understand challenges in gaining this information and prospects for the future

13. November 22 NO CLASS (Thanksgiving Break)

14. 3rd Policy Memo Discussion (Nov 29)

Due: 3rd memo

Students will summarize their policy issues and defend their position to the rest of the class.

15. Case Study: Current Congressional Legislation (Dec 6)

This class will discuss current legislation: TBD

Students should read: TBD

16. Final Exam (Dec 13)

REQUIRED READINGS

The required readings for the course are available on the Internet, all else will be handed out.

Bush, Vannevar, 1945: *Science the Endless Frontier*, Office of Scientific Research and Development, U.S. Government Printing Office, available online at http://www.nsf.gov/od/lpa/nsf50/vbush1945.htm

Unlocking Our Future: Toward a New National Science Policy, 1998*:* A Report to Congress by the House Committee on Science, available online at www.house.gov/science/science_policy_study.htm

National Science Board, 2004*: Science and Engineering Indicators 2004:* National Science Foundation, NSB-04-01, 2004, available online at http://www.nsf.gov/sbe/srs/seind04/start.htm

Teich, A. and K. Koizumi, *An introduction to R&D in the FY 2005 budget*, chapter I in AAAS Report XXIX: Research and Development FY 2005, available online at http://www.aaas.org/spp/rd/05pch1.pdf

FOR ADDITIONAL READING (some will be discussed in the course)

General Public Policy

Kingdon, John A., *Agendas, Alternatives, and Public Policies*, Second Edition, Addison-Wesley Educational Publishers, 1995. (highly recommended)

Kaul, I., I. Grunberg, and M. Stern, 1999: *Global Public Goods: International Cooperation in the 21st century*, Oxford University Press.

General Science Policy

Stokes, Donald E., 1997: *Pasteur's Quadrant: Basic science and technological innovation, Brookings Institution Press.* (highly recommended)

AAAS Research and Development FY 2005, AAAS Report XXIX, http://www.aaas.org/spp/rd/rd05main.htm

AAAS, Science and Technology Policy Yearbook 2003, http://www.aaas.org/spp/yearbook/2003/yrbk03.htm

Wells Jr., William G., 1996: Working with Congress: A Practical Guide for Scientists and Engineers, *2nd ed, AAAS.*

Sarewitz, Daniel, 1996: *Frontiers of Illusion: Science, Technology, and Politics of Progress*, Temple University Press.

The National Academies, 1995: *On Being a Scientist: Responsible Conduct in Research*, National Academy Press, http://books.nap.edu/books/0309051967/html/index.html

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

Smith, Bruce C.R., 1990: *American Science Policy Since World War II*, Brookings Institution Press.

Dupree, A. Hunter, 1986: *Science in the Federal Government: A History of Policies and Activities*, The John Hopkins University Press.

The National Academies, *Issues in Science and Technology*, http://www.issues.org/

Public-Private Sector Partnership in Weather and Climate Services

NRC, 2003: *Fair Weather: Effective Partnership in Weather and Climate Services*, National Academies Press.

Impacts of Space Weather

Carlowicz, M. and Lopez, 2002: R., *Storms from the* Sun: The Emerging Science of Space Weather, John Henry Press.

Odenwald, S.F., 2001: *The 23rd cycle: Learning to Live with a Stormy Star,* Columbia University Press.

Song, P., H. Singer, and G. Siscoe, 2001: *Space Weather, AGU monograph 125,* American Geophysical Union.