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PUBPOL 481/PHYSICS-481 SYLLABUS: WINTER TERM 2015

NATIONAL SCIENCE POLICY IN THE 21ST CENTURY

Professor Homer A. Neal

8:30 – 10:00 am
Tuesday/ Thursday

Over the course of the last century, an overwhelming number of societal advances have been driven by progress in science and technology. Medical treatments and cures have been developed, new economic frontiers have been opened, and the overall quality of life has been enhanced. Yet, the public has generally treated these advances as things that just "happen", without there being any recognition that many are, in fact, the result of sustained commitment by the nation to support science and technology through a deliberate set of policies. This course will highlight the important role of national science policy in achieving societal goals. Science policy is sometimes a result of a larger public policy, and as society becomes more complex, so too, do those policies governing science.

The aim of this lecture course is to introduce students to the manner in which science and technology issues both shape and are shaped by public policy. Issues such as global climate change, energy sustainability, human genomics, and exponentially evolving technologies (e.g, info-, bio-, and nano-) are among the most challenging and complex facing contemporary society. The course will review the historical role of national science policy in addressing the health, welfare, and security needs of the nation, and will provide an organizational map to help the reader better understand how the federal government develops and executes its science policy and why it funds science. It will explore how universities, national laboratories, and industry partner with the federal government to carry out scientific research, and why states are developing their own scientific and technological support structures. The course will examine the interactions between the scientific community and policymakers, and the grand challenges that face science and society, including environmental preservation, advances in new technologies, transportation, power generation, and prevention and cure of diseases. The

urgency of strengthening these interactions in order to meet such significant scientific and technical challenges will be explored.

The list of broad topics to be covered includes:

- Organization of Governmental Entities supporting scientific research
- How National Science Policy is Made
- Funding Trends
- The Role of Universities, Industry, the National Labs, and States in Science Policy
- Defense Research
- Big Science
- The Science and Engineering Workforce and Science Education in the US
- Ethics and Integrity in Science
- Globalization and Science Policy
- Homeland Security
- Science Policy in the New Administration

Lectures will also include the background and structure of the US science policy as well as the dissection of current science policy issues.

The course is targeted to a broad audience and no prior science background is necessary. It is expected that the course would be of particular interest to students in public policy, engineering, any of the science disciplines, higher education, and other similar disciplines.

Assignments will include readings, papers, and two exams as described below.

GRADING AND COURSEWORK:

The course grade will be based on homework assignments, and two exams. Students will be expected to read all reading assignments prior to class.

Texts: chapters from Neal, Smith, McCormick "Beyond Sputnik: US Science Policy in the 21st Century", the National Science Foundation's "Science & Engineering Indicators 2010 (http://www.nsf.gov/statistics/seind10/) , the American Association for the Advancement of Science Report (http://www.aaas.org/spp/rd/rdreport2011/), and additional reading as assigned

Assignments: there will be two written assignments (a science editorial and a policy memo), one semester report, 2 exams, and class readings (see details below)

All writing assignments should be 1.5 to double-spaced. Use 11pt or 12pt font.

More details about the science editorial, policy memo and semester report are given below.

Science Editorial

On occasion there are instances in which perspectives on a particular issue or set of issues need to be expressed. We are all familiar with the general media editorial columns. The authors of these pieces, while citing facts, are taking a position on an issue or making a point. Likewise, in science media (e.g. Science Magazine, Nature) there is a place for commentary on topics and issues in science and science policy. These editorials are written not only by prominent scientists but also policy makers. This first assignment is intended to provide students with the opportunity to reflect on a specific topic or issue in science policy. An example of an editorial from Science Magazine is available on Ctools. Students may wish to express a viewpoint, to present a specific argument for or against a policy change, or to present the perspective of a particular subpopulation (e.g. women in physics, etc). Good editorials are not merely venues for expressing one's opinion but should also be grounded in fact. Editorials should be between 750 and 850 words and have a well-conceived focus.

Policy Memo

This assignment is intended to give students practice in writing a policy memo. The paper should be set-up like an actual memo. Students can create the person to whom they are writing the memo or can use an actual policymaker in science (e.g. Representative Vern Ehlers, OSTP Director John Holdren). Again, a topic in science policy should be chosen. The memo can be either an argumentative memo (arguing for or against a policy or change in policy) or a strategy memo (presenting a proposed mechanism for implementing a policy). A little background reading may be necessary in order to provide the factual basis for what you present. Memos should start with an "executive summary" (e.g., an abstract) and should end with a reminder of why the topic/issue at hand is so important. Example topics might be increased funding for a specific big science project, or funding for one of the agencies, or expansion of undergraduate research opportunity program support, or a plan for revamping K-12 math and science curriculum in a specific state. Memos should be between 1,200 and 1,500 words in length.

Semester Report

Students should select a topic in science policy and take the opportunity to explore it further. The report should be 10-12 pages in length. A general approach might be to review materials that are available and present a discussion that covers the history of the topic and related issues as well as what keeps the topic prominent in the realm of US science policy and where things seem to be headed, if relevant. Examples might be university technology transfer, human embryonic stem cell research, or the Superconducting Super Collider. Another possibility is to select a prominent player in US science policy, for example Vannevar Bush, or a particular position (the President's Science Advisor). In the case of the former, one might choose to discuss who the person was, his/her importance to US science policy, what important contribution the person made, etc. For the latter, one might choose to review and discuss how the position was formed and how it has changed over the years.

Grading Weights:

Science Editorial – 5%
Policy Memo – 5%
Attendance – 10%
Semester Report – 25%
Exam #1 – 25%
Exam #2 – 30%

LECTURE AND READING SCHEDULE

The table below provides the planned schedule of lectures. Most lectures are provided by the course professor. For particular topics expert guest speakers will address the class. **The schedule WILL change.** Please consult the CTOOL course site for the latest update on the schedule.

(The shorthand "NSM" refers to the required text by Homer Neal, Tobin Smith, and Jennifer McCormick, *Beyond Sputnik: US Science Policy in the 21st Century* (University of Michigan Press, 2008)

DATE		**TITLE**	**READINGS**
Thursday, January 8		**Introduction and Overview: What is Science Policy**	NSM-Chapter 1 "Science: The Endless Frontier" (Summary of Report, chapters 1, 6);
Tuesday, January 13		**Exciting Science and Technology Frontiers**	NSM- Chapter 2
Thursday, January 15		**The players in science policy**	NSM- Chapter 3
Tuesday, January 20		**Federal funding for research: rationale, impact, trends**	NSM-Chapter 5 ;"The Allocation of Scientific Resources" http://www.nsf.gov/nsb/documents/2001/nsb0139/nsb0139.pdf
Tuesday, January 22		**The Public**	NSM – Chapter 10

Tuesday, January 27		**Science and Engineering Workforce**	NSM-Chapter 16
Thursday, January 29		**Scientific Infrastructure**	NSM, Chapters 13
Tuesday, February 3		**The process of making science policy**	NSM- Chapter 4
Thursday, February 5		**Homeland Security, Innovation, and Science Policy**	NSM- Chapter 18
Tuesday, February 10		**Ethics in Scientific Research**	NSM- Chapter 14
Thursday, February 12		MIDTERM	
Tuesday, February 17		**Industry and the States**	NSM- Chapter 8, 9
Thursday, February 19			
Tuesday, February 24		**Computing and Science Policy**	
Thursday, February 26		**Nuclear Power**	
Tuesday, March 3		Spring Break	
Thursday, March 5		Spring Break	
Tuesday, March 10		**Big Science**	NSM- Chapter 12; Daniel Kevles, "Big Science and Big Politics in the United States: Reflections on the death of the SCC and the Life of the Human Genome Project", *Historical Studies in the Physical Sciences* 27 (1997), 269-98
Thursday, March 12		**Space Policy**	

Tuesday, March 17		**Science for National Defense/Federal Laboratories**	NSM- Chapter 7, 11
Thursday, March 19		**Grand Challenges (Energy)**	NSM- Chapter 19
Tuesday, March 24		**Science Policy and the Nation's Future**	NSM-Chapter 20
Thursday, March 26		**STEM Education/Universities**	NSM-Chapter 15
Tuesday, March 31		**Grand Challenges (Physical Sciences and Engineering)**	NSM- Chapter 19
Thursday, April 2		**Grand Challenges (Life Sciences)**	NSM- Chapter 19
Tuesday, April 7		**Grand Challenges (Environmental Policy)**	NSM- Chapter 19
Thursday, April 9		**Globalization and Science Policy**	NSM- Chapter 6, 15, 17
Tuesday, April 14		**Course Review**	
Thursday, April 16		**Course Review**	
Tuesday, April 21		**Exam#2**	