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PUP4503 - Government and Science

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Overview:

Science and technology (S&T) are major agents through which significant economic and social change occurs in most societies. For a long time, government and science and technology were considered two very different areas with no real interaction. That is no longer the understanding. In fact, government has become extremely important with regards to S&T policy; lagging in the area of science and technology means that a society is noncompetitive with the more advanced economies in the world. Falling behind technologically is particularly devastating for advanced states since it undermines other facets of the state's activities including military and diplomatic. Government represents the society's organized authority for achieving social goals. Those goals can be domestic including public health, safety and welfare, military, or international in nature. Therefore, modern states have became aggressive in insuring that science and technology is harnessed for achieving greater good within the society. This does not mean that the good achieved flows to the people's benefit, it may be used to improve the state's military power such as occurs in North Korea. That can result in a system of very loose government control to the earlier socialist (communist) states where science and technology were totally controlled by the government. In the former situation, science and technology activities are largely conducted in the nongovernmental sector whether for profit or not for profit although the government normally reserves the power to intervene if necessary. Intervention can occur due to potential hazard (environmental or industrial pollution) or because the private sector is moving too slowly or needs

economic or political support in order to proceed forward. Despite the rhetoric, S&T politics often arises over companies, universities or individuals seeking government aid to carry out whatever project they have in mind. For example, the federal government is expected to help fund development of alternative cars to the present gas driven vehicles. This was being supported to the tune of $25 billion, a program initiated first by the George W. Bush administration but continuing today. The Bush administration was considered anti-government but it supported a number of initiatives in S&T policy that aided private sector players. The lone inventor in their garage still exists but modern S&T is more likely the product of the large organization whether private or public doing the work. UCF for example is doing over $25 million annually in sponsored research – moneys received from government (federal and state), foundations and corporate sponsors. For the former socialist states, no private sector exists with regards to science and technology since all sectors of the society were under state control. Even in democracies, the role of government with regards to S&T policy can become extremely intrusive and possibly disruptive of advances in the field. Many states intervene because the products produced are seen as harmful or potentially disruptive. Groups within a society often call upon government to protect their interests - this approach includes regulation of S&T work. In the United States, you see this intervention in the shape of the U.S. Patent Office.

Within the United States, the system for handling science and technology policy has grown into a hybrid containing both private and public sector activities, which intersect and complement/compete with each other. The American system is one based on limited government power normally (especially peacetime) with the potential for total government control during an extreme emergency such as depression or war. For example, stimulus funds went to roads and highways for jobs but some portion went to the science agencies to fund research projects already approved but for which there had been no funding. However, in certain areas, nuclear energy and genetic engineering for example, the U.S. government from the start has aggressively regulated what is possible. In this course, we will look initially at the development of the American science and technology system and how public policy is developed and implemented and in doing so examine the international ramifications of S&T policy. The initial materials will focus on the background that has led the U.S. to its present system of governance, its internal processes, relationship to the public, and how that relationship impacts how S&T policy is made and implemented. Several specific policy areas will be considered subsequently as examples of American policy in the area of science and technology.

In this course, the terminology "S&T" for science and technology and "R&D" for research and development will be employed to describe the subject. S&T refers to the broader relationship between science and technology for the society while R&D refers to the relevant activities engaged in when advancing science through research and developing technological applications. The concepts of applied and fundamental R&D are often used but one should be aware that the dividing line between the two is very wavy and applied research often leads to fundamental research outcomes and vice versa. In order to build the new technology, fundamental processes often need to be discovered and understood first or failure will be the only outcome.

Also, in this course, students will be presented examples drawn from across the spectrum of S&T policy. For example, research conducted on health care problems such as AIDS or cancer treatments demands that fundamental knowledge be gathered at the molecular level regarding the chemical and biological processes underlying those pathologies. Science and government is our topic but that covers the range of S&T policy from education, environmental, space, energy, health or whatever becomes socially important for the society. The course will also incorporate materials from comparative experience, situations where S&T policy can be moving from a totally state dominated system to a mixture of institutions and policies often still in flux. Economically developing states in particular struggle with S&T policies due to their human and capital shortages. There is nothing automatic in S&T policy – the entire edifice is built on highly educated workforces and substantial investment from whatever source private or government. Successful policy builds on investments in education – an issue for the United States due to our growing deficiency in scientifically and technically trained workers. The United States cannot afford to cut off immigration at least at the highly educated level since native born American students are uninterested and unmotivated to enter science and engineering disciplines. This approach however leads to conflicts over American values when those potential immigrants who are less educated are rejected or deferred for long periods of time. This accelerates the growth of illegal immigration among groups not normally thought of as illegal such as Irish and English citizens who blend in well due to their English skills and race.

Course Objectives:

Students will acquire a general understanding of the historical foundations, present context and future development of S&T as an arena for human activities. As part of that process, students will:

1. Develop understanding of the field's historical development.

2. Understand the influence of science and technology policy upon the development of the American education and economic system.

3. Develop an understanding of the international implications of science and technology activities.

4. Become aware of the organizational forums and processes (public, private and international sectors) through which S&T policy is developed and exploited for human benefit.

5. Develop an appreciation for the human and economic developmental potential inherent in S&T activities even for advanced societies but especially underdeveloped societies where the needs are so great.

6. Analyze the changing parameters of S&T policy as we move through the

21st century especially the rapidly changing nature of global scientific activities with regards to genetic engineering, the environmental and economic development including international economic competitiveness.

7. Demonstrate the ability to access useful information regarding ongoing S&T activities and proposed future R&D activities.

Communicating within the Course:

In this class our official mode of communication is through the email located inside Webcourses and through the Course Announcements Discussion site. All communication between student and instructor and between student and student should be respectful and professional. It is the student's responsibility to check the "course mail" tool or "course announcements" discussion site frequently. You are required to create a Knight's Email account at www.knightsemail.ucf.edu for separate official communication from the university. It is my understanding that Knight's Email is the address used by the university and is the one in the course mail and cannot be eliminated. If you wish to use another email as your primary, you will need to forward communications from Knight's Email to your other address. As instructor, I am unable to directly send sensitive course information to your personal email account.

Assigned Text:

Homer A. Neal, Tobin L. Smith, and Jennifer B. McCormick, *Beyond Sputnik: U.S. Science Policy in the 21st Century* (Univ. of Michigan Press, 2008).

Grade Structure:

Grades are determined through a variety of student activities including two examinations taken on line through the course quiz function, two assignments completed on the web, an introductory assignment for extra credit, a course project proposal and a course project submitted on line through a drop box. The overall weight assigned to each section is shown below with a brief description provided for each facet. Due dates are provided in the assignments section. A total of 1000 points will be assigned across the semester with each graded segment assigned a point value. Final grades will be recorded as A, B, C., etc rather than incorporating pluses and minuses. Grades are posted through the course website and accessible as soon as the materials are graded.

Plagiarism and Cheating of any kind on an examination, quiz, or assignment will result at least in an "F" for that assignment (and may, depending on the severity of the case, lead to an "F" for the entire course) and may be subject to appropriate referral to the Office of Student Conduct for further action. See the UCF Golden Rule for further information. I will assume for this course that you will adhere to the academic creed of this University and will maintain the highest standards of academic integrity. In other words, don't cheat by giving answers to

others or taking them from anyone else. I will also adhere to the highest standards of academic integrity, so please do not ask me to change (or expect me to change) your grade illegitimately or to bend or break rules for one person that will not apply to everyone.

- First Examination - 20%
- Second Examination - 20%
- Assignments - 20% total (total of two assignments across the term)
- Course project proposal – 10%
- Course project - 30%
- Introductory Assignment – 5% — extra credit –only opportunity for extra credit provided during the term, once closed, no more extra credit opportunities. Participation in forums in a significant manner will be used by the instructor to make any grade adjustments for students on the border line between two grades.

NOTE: All assignments and other submissions must be done in MS Word format; otherwise, I am unable to open the document. This may lead to a delay in grading the materials while you resubmit the assignment. A second occurrence will result in a "zero" for the assignment. This restriction means no WordPerfect, MS Works or other word processing programs are accepted. This is not optional.

Examinations can incorporate both essay and short answer formats. Students will be queried as to their understanding of the processes engaged in developing space policy. The Assignments will test student understanding of different information and concepts discussed in the modules and in the readings. The Introductory Assignment involves students completing a course-related biography and demonstrating certain techniques related to successfully completing the course. It is the only extra credit assignment available during this course so do not ask for additional.

The Web Link Annotation as part of the extra credit Introductory Assignment involves students locating Internet links not already identified in the course. Their assignment becomes annotating (describing and evaluating) in general terms the particular site's content, usability and then make some assessment as to its validity, usefulness and reliability as a possible source of information. Simply put, is the link worth accessing or not? Much of the material on the Web is of dubious reliability, becoming a critical content evaluator and consumer of information is an important part of the course.

Course Project:

In this segment of the course, all students complete a course project. The student, based upon agreement with the instructor, chooses a specific project from the list provided or another topic. In either case, the proposal must be approved by the instructor. The possibility exists depending upon the number of students in the course that individual students will produce duplicate projects. This situation provides the opportunity for instructor comparison between the individual projects. Individual students are graded on the originality and thought

of the project for which they are responsible. Note: Wikipedia is not acceptable as a reference in this course for your project proposal, project or assignments.

The list of possible topics is as follows:

1. An examination of what the State of Florida does to support the development of high tech industry and education within the state. The goal is to improve the state's economic and technological competitiveness relative to other states in order to attract high tech industries to the state. The University of Central Florida's Research Park is one example of such an effort although limited to the region it has been a model for other states. Your analysis should incorporate discussion of various state or regional initiatives including the "I-4 Corridor Initiative," educational initiatives such as Nanotechnology, and the Florida Solar Energy Center as some examples. Your analysis should also incorporate Florida's links with the federal government especially with regards to its public universities. You can use UCF as one case study.

2. The supply of trained scientists and engineers has become a major political concern with regards to science and technology policy. Too few Americans are completing the basic course work in science and math necessary for advanced technical training. A similar situation arose in the late 1950s and early 1960s when the United States perceived itself as falling behind the Soviets in production of trained scientific and engineering personnel. This became particularly an issue after the Sputnik was launched in October 1957. Your analysis here should first describe the present situation with regards to science and engineering personnel in the United States with regards to numbers, national origin, and level of education and what field of study. Then, describe programs that are being implemented to boost the numbers and how successful have those programs been improving the situation or is the United States dependent upon other states for our scientists and engineers. The National Science Foundation (NSF), the National Academy of Sciences (NAS), and the American Association for the Advancement of Science (AAAS) are among the locations you might visit to begin your research.

3. Embryonic stem cell research has been controversial due to its links to the abortion and right to life controversy. The George W. Bush administration prohibited federally funded research with regards to embryonic stem cell research, a decision partially reversed by President Obama when he entered office in 2009. The question for states is whether they can support such research and what economic impact do they see resulting from their efforts. This situation becomes more complicated with the federal government back in the game but many states initiated programs fostering such research. Even Florida with its restrictions on state funding of embryonic stem cell research has pursued the goal of using adult stem cells to achieve the same outcomes as embryonic stem cell. The topic is: what is meant by stem cell research, what is U.S. policy, and where do the states stand within that spectrum of program possibilities, ranging from total prohibition of any stem cell research to use only of adult stem cells to use of embryonic stem cell research. Journals such Science, Nature, various medical and policy

journals, and materials from the National Institutes of Health can provide information on this issue. This is an issue where states had an opportunity to move forward in the absence of the federal government (2001-2008), the situation is changing but no one knows the likely future of government activity in this field. Private activity has been critical in sustaining the field but the research costs are so high, their impact is likely to be limited in the long run.

4. Evaluate the commercialization plans being developed for the state of Florida with regards to space industry. Identify the opportunities and problems inherent for commercialization of space industry. Florida began with the advantage of being one of two major spaceports, a fact that brought industry to the state along with NASA at the Eastern Test Range and the Kennedy Space Center. However, with the end of the Cold War and the slump in NASA budgets symbolized by the 2010 shuttle shut down, Florida has entered a period of decline. Florida in the late 1980s with the establishment of the Spaceport Florida was on the cusp of staking out a strong state position in space commerce. The Spaceport Florida Authority was replaced by Space Florida but Florida appears to have initially missed the boat on space tourism and now is in danger of completely losing its edge in commercial space activities. The topic is to explore what policy choices were made that have undermine Florida's position and how Florida responded and your evaluation of future prospects for recovery and growth.

5. Other topics can be pursued with instructor approval. The alternative topic must be spelled out specifically and in some detail, see instructors below for format and length.

Course project proposals must be chosen **by 2300 hours, 19 September 2012 and posted to the drop box on the course website.** The project proposal involves a prospectus of at least 750 words explaining what the student proposing to do and what sources (minimum of five) have been preliminarily found available to complete the project successfully. Provide a word count.

Course projects must be:

- a minimum of 3,000 words - maximum 4,000 words
- 15 references, only half can be solely web although library journal articles accessed on the web are considered web only
- provide a word count
- Project and proposal formatting - use American Psychological Association (APA) format – see UCF Library website for information as to format.

After review by the instructor, students should begin their project.

- Failure to turn in an acceptable proposal **will result in an "F"** for the entire course project, meaning 40 percent of your grade.
- Changing your topic after it is accepted:

- Must be done by the **closing date of the First Examination.**
- **Any changed topic** must be approved by the instructor; otherwise, the changed topic will not be accepted.
- Other changes in the original topic in terms of scope or focus but still the same general topic, for example, should be emailed to the instructor for his approval.
- **NO CHANGES WILL BE ACCEPTED AFTER 1 NOVEMBER AT 2300 HOURS.** This is in order that sufficient time exists to complete your project.
- **Late projects or assignments** are graded down a letter grade a day until an F grade is reached. However, failure to complete a satisfactory project will result in an "F" for the course regardless of the number of points earned in other portions of the course.

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File: Assignment Schedule

PUP4503 - Government and Science
Roger Handberg (mailto:handberg@mail.ucf.edu?subject=PUP4503)

Schedule of Assignments
Fall 2012

Module #	Module name	Date Open	Date Close	Assignment
Module 0	Getting Started	20 August	3 September at 2300 hours	Complete assignments in Module 0 including posting web annotation to the "Introductory Assignment"

Module 1	Introduction - Historical Context & Ideology	20 August	September 17th at 2300 hours	Read Materials and respond to Discussion Group: "Should Government Control Scientific Research or Let Science follow where ever it lead?"
Project Proposal	Picking your topic	20 August	19 September at 2300 hours	Submit project proposal
Module 2	S&T Policy Processes: Executive-Legislative	17 September	5 October at 2300 hours	Complete Assignment 1
Module 3	S&T Policy Processes: State and Private	5 October	17 October at 2300 hours	Read materials and respond to Discussion Group "Is the Distinction Between Private and Public Obsolete in S&T Activities"

First Examination	Test	18 October	21 October at 2300 hours	Complete examination online
Module 4	Public Opinion	22 October	31 October at 2300 hours	Read materials and respond to discussion group: "Should the public has a say in S&T policy choices? If, how would their input be done?"
Module 5	What is Innovation and How Do You foster it?	31 October	7 November at 2300 hours	Complete readings and begin work on Assignment 2
Module 6	National Security Issues	8 November	15 November at 2300 hours	Read materials and respond to discussion group: "Can the U.S. Control the Flow of Knowledge in the World?" Complete Assignment

				2
Module 7	International Economic Competition	16 November	26 November at 2300 hours	Complete Readings
Project	Project	18 November	25 November at 2300	Turn project report in through drop box
Module 8	International S&T Policy	26 November	3 December at 2300 hours	Complete readings & Respond to "Does the U.S. have a moral responsibility not to steal the best and the brightest From the UDCs?"
Second Examination	Test	4 December	7 December at 2300 hours	Complete exam online

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