

Science, Technology and Public Affair
Spring 2007
PAF 547/GLG 547/BIO 515/HON 494

Professors: Michael Crow, Daniel Sarewitz
Teaching Assistant: Taylor Spears
Time: Wednesday 7:40 a.m.- 10:30 a.m.
Place: Coor 5536

Office Hours:

Sarewitz: Tuesdays, 2 p.m. – 4 p.m., or by appointment. 203B Social Sciences Bldg.
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Crow: By appointment, michael.crow@asu.edu; 480-965-8972

Spears: Mondays and Wednesdays, 10:45 am – 11:45 am, or by appointment. 204 Social Sciences Bldg. tcspears@asu.edu.

Course materials:

1. Course Reader, available at Alternative Copy Shop, 715 S. Forest Ave., Tempe
2. Kuhn, Thomas, *The Structure of Scientific Revolutions* (University of Chicago Press)
3. Stokes, Donald, *Pasteur's Quadrant: Basic Science and Technological Innovations* (Brookings Institute Press).

Both books are available at the ASU bookstore.

Course description: This class will explore the political, economic, cultural, and moral foundations of science and technology governance in democratic society. Science and technology are the most powerful transforming forces in the world today. We will investigate, from a variety of perspectives, the ways in which this transforming force is influenced by decisions that humans make about priorities, organization, direction, and rate of advance of scientific knowledge and technological innovation.

Course requirements:

I. Participation: Students MUST read all material for each class prior to the class and come prepared to discuss materials from course reader and books. (You should plan to finish required chapters from *Pasteur's Quadrant* and all of *The Structure of Scientific Revolutions* by the 6th class.) We will occasionally email additional relevant readings prior to class throughout the semester.

Classes will be centered around group discussions of the issues and themes raised in the readings, augmented by occasional lectures to provide additional background. We fully understand that different students will participate in different ways in class discussion, and that all students may not participate in all classes. **Nevertheless, participation in the class discussions is important and required.** At times we will call on students by name to help ensure broad participation.

- (1) For each class, three students will be assigned to help lead the discussion by presenting two or three important themes or problems raised by the week's readings.

(2) Two additional students each week will present a relevant and current news item for consideration by the class. News items should be selected to illustrate interesting and non-obvious aspects of the interactions among science, technology, and society. News items should not simply be coverage of particular scientific or technological advances.

Taylor will organized sign-up schedules for the themes/problems and news items. Students responsible for the questions and news each week should bring sufficient copies for everyone in the class. Discussion themes/problems and news items should also be posted to the class website prior to the class. Please email these to Taylor (tcspears@asu.edu) 24 hours prior to class so they can get posted. Themes/problems should be sent as PowerPoint slides. In addition, all students are expected to keep up with current issues in science, technology, and public affairs through daily reading of the *New York Times* and/or *Arizona Republic*.

II. Project: A significant part of each student's work for this course will be focused on a group project leading to a written paper and an oral presentation. Students will work in groups of three. The projects are in-depth *social assessments* of a particular technology that is currently "in the news." The assessments will have three basic components:

1. Retrospective assessment, addressing such questions as: what are the social, scientific and technological origins of the technology? How did the technology evolve over time? What motivated development of the technology? What was the role of government, private sector, interest groups, and other players in the past development of the technology? What were the costs of developing the technology? How was the technology transferred from laboratory to user? What social and economic forces shaped the technology? What social and economic implications were anticipated? What social and economic outcomes actually occurred? What political or social conflicts (if any) arose around the technology? Who supported the technology, and who opposed it? Who has benefited from the technology, and who has not? Etc.

2. Present-day assessment, addressing such questions as: How much is currently being invested in development of the technology? Where is the research and development being conducted (specific institutions, and sectors)? What is the role of government, private sector, and other players in the development of the technology? How is the technology being transferred from laboratory to user? What are the current social and economic forces shaping the evolution of the technology? What are the current social and economic impacts of the technology? What political or social conflicts are related to the technology? How is the technology being regulated by the government or otherwise governed by society? Etc.

3. Future assessment: How is this technology expected to evolve in the future? What are its most important future applications expected to be, and what are the possible social implications from these applications? What types of unexpected outcomes and

applications might derive from the technology? What social and economic forces are likely to be involved in shaping the technology? What types of mechanisms, if any, are likely to be necessary to adequately govern this technology and its impacts on society?

4. Recommendations: The final section of the project should make recommendations about the future of the technology, including: levels of investment; sectors that should be involved; choices about what directions innovation should be steered; oversight, governance and regulatory needs and options; etc.

Taylor will organize the groups, based on a combination of maximum interdisciplinary interaction, mutual interests, and compatible schedules.

Groups may choose any technology that is “in the news,” but the selected technology needs to be, on the one hand, sufficiently broad so that there is enough information available to do an effective assessment, but not so broad as to be unmanageable. “Nanotechnology,” is definitely too broad. “Carbon nanotubes” is probably too narrow. Groups should consult with the Mike, Dan, or Taylor as they are selecting their topic, to make sure they are on the right track.

Some examples of past topics are:

- Prosthetic devices
- Groundwater flow models
- Electric vehicles
- Nanotechnology for drug delivery
- Solar energy technologies
- Lifespan extension
- Genetic Testing
- Telephones
- Plant-derived Vaccines

Maximum length for the papers is 30 pages, double-spaced, 12-point font, including all references and figures.

The schedule for the projects is as follows:

Week two (Jan. 24): groups are assigned.

Week four (Feb. 7): project proposals are due. These should include a brief (2-4 page) description of the scope of the project and the sources that will be used, plus an annotated bibliography of potential sources (2-4 additional pages).

Week nine (March 21): Project draft due. This should be a complete first draft, with references, of the project paper. Most of important issues should be identified and discussed, with remaining research questions highlighted. A comprehensive reference list should also be included.

Week 13 (April 18): Final project paper due.

Weeks 13 and 14 (April 19, 26): Project presentations.

III. Final Exam. There will be a three-hour, scheduled, open-book (and notes) final exam.

Grading:

Final exam: 35 percent

Project: 35 percent

Participation: 30 percent

A note on attribution requirements for the project:

All research papers should properly reference their source material. 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, requires citation.
- If the text you are making 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 to make the point.

There are two important reasons for rules for 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.