Knowledge is always incomplete, yet decisions must be made. This seminar explores uncertainty and its relation to decision making, with a particular focus on the ways that science is applied in order to improve decisions. We will explore the many meanings and origins of uncertainty, using theoretical and case-based approaches. A central theme will be the relation among uncertainty, scientific prediction, and decision making, especially in politically charged issues, for example as related to management of the environment. Ultimately, we will want to understand how effective decisions can be made in the face of inevitable uncertainties.

The course will be conducted as a seminar, without formal lectures, and with students expected to participate centrally in not just the class discussion but in framing the issues that stimulate discussion. Obviously, then, it is critical that the week’s readings all be completed prior to class. In order to facilitate productive discussion, for each class each student must write a brief (300-500 words) synthesis of key issues, problems, and questions raised by the week’s readings. These weekly assignments should also strive to identify connections (contradictions, tensions, etc.) between the individual readings for that week, as well as with readings from previous weeks.

In addition to the weekly readings and synopsis, students, working in groups of two, will write a research paper on a current dilemma in public affairs characterized by high uncertainty and urgency to take action. More information on the paper is presented below, after the syllabus. A project proposal is due on Sept. 11, annotated bibliography on Sept. 25, draft of the paper on Oct. 30, and the final paper on Dec. 4.

Grading for the course will be based on weekly assignments (33%), class participation (33%), and a research paper (33%).
Syllabus

Required Texts:
3. Course Reader
4. Plus additional readings during the semester as appropriate

August 28, 2008
Class 1. Introduction, orientation, expectations, requirements.

What are decisions?

September 4
Class 2. How we think; how we decide.

Readings:

September 11
Class 3. Origins of uncertainty in human affairs
**Project Proposal Due**

Readings:
September 18
Class 4. Origins of uncertainty in science
Readings:

September 25
Class 5. The Prediction Problem
**Annotated Project Bibliography Due
Readings:

October 2
Class 6. Reality-Based Interlude: Cost Risk Management
Guest Speaker: Rick Shangraw, Ph.D., ASU VP for Research and Economic Affairs
Readings:
October 9
Class 7. Predictions and Uncertainty
Readings:

October 16
Class 8. Constructing Uncertainty
Readings:

October 23
Class 9. Constructing Certainty
Readings:

October 30
**Project Draft Due**
Class 10. Risk--1
Readings:

November 6
Class 11. Risk—2
Readings:

November 13
Class 12. Decision Making and Uncertainty—1
Readings:


November 20
Class 13. Decision Making and Uncertainty—2
Readings:


December 4
Class 14. Project Presentations
**Final Project Due

Research Project

The project will be done by groups of 2 students (if there are an odd number of students in the class, then there will be one group of 3). To the extent possible, the duos will comprise students from different disciplines/departments.

The goal of the project is to explore the origins, characteristics, and role of uncertainty in a current public policy dilemma that must be resolved despite incomplete and inconclusive (yet perhaps overwhelmingly abundant) information about the future. The title of the paper should be expressed as a normative question that encapsulates the specific dilemma, for example:

Who should receive smallpox vaccinations in the U.S.?
How should the U.S. protect against the Avian Flu Virus threat (or the bioterrorism threat)?
Is the Yucca Mountain nuclear waste repository safe?
Can the U.S. halve its greenhouse gas emissions by 2025?
Should the U.S. open the Arctic National Wildlife Refuge to oil drilling?
Is the Endangered Species Act protecting biodiversity?
Should human germ-line engineering be permitted?  
What would be the most effective way to reduce cancer deaths in the U.S.?  
Etc. etc.

The paper is not an exercise in supporting one particular answer to the question; on the contrary. Yet neither should it be a summary of, say, competing political positions regarding the dilemma. Rather, it is an exploration of sources of multiple potential answers to the question—i.e., uncertainty—and the consequent implications for action. The conclusion to the paper should include a series of reasonable policy options in the context of existing uncertainties.

Needless to say, the paper should build on and be informed by ideas explored in the class, but the substance of the paper should be based on independent research.

During the semester, you will first submit a brief (1-page) project proposal, followed by an annotated bibliography (minimum 10 published (i.e., not just on the web) sources with a paragraph or two of annotation for each), followed by a draft of the paper, before submitting the final paper. Deadlines for each assignment are noted in the syllabus, above, and also listed below. The final paper should be no more than 20 double-spaced pages in length (plus notes and references).

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.

During the last class, students will briefly present the results of their projects.

Timeline:

The brief (1-page) project proposal is due on Sept. 11.
The annotated bibliography (minimum of 10 sources) is due on Sept. 25.
The first draft of the paper is due on October 30.
The final paper is due on the last class.