File: Class 479 PHIL/STV 479 Environmental Risk Assessment

Spring 1999

Class Time: Tuesday/Thursday 2:00-3:15 Classroom: DeBartolo 207

Professor: Dr. Kristin Shrader-Frechette

Place of Office Hours:	Reilly Center, O'Shag, third floor (sign-up sheet available)
Professor's Office Hours:	Tuesday, Wednesday, Thursday, 2:50-4:00 p.m. or any other day and time, by prior appointment
Course Goals:	—to understand quantitative risk assessment (QRA) as applied both to ecological risk assessment and human-health risk assessment; —to evaluate logical, epistemological, ethical assumptions in QRA; —to gain some methodological and scientific perspectives on the contemporary problems in environmental risk assessment. —to learn how to critically evaluate contemporary examples of QRA.
Course Texts:	NAS = National Research Council/National Academy of Sciences, Risk Assessment in the Federal Government, 1983. DT = Resnik, Choices: An Introduction to Decision Theory, 1987. R = course reader (xeroxed). Includes readings from Risk, Science, American Scientist, Nature, QRA books, and U.S. National Academy of Sciences.
Basis for Determining Course Grade:	
(undergraduates)	20 percent, final exam (objective) 20 percent, midterm exam (half essay, half objective) 40 percent, 2 short papers as specified later in syllabus 20 percent, class participation in analysis of methods and examples of QRA
(graduate level)	20 percent, final paper 20 percent, midterm exam (half essay, half objective) 40 percent, 2 short papers as specified later in syllabus 20 percent, class participation in analysis of methods and examples of QRA

Main Sections of the Course and Percentages of Class Times

Percent of Class:		
22%	1.	Overview of Quantitative Risk Assessment (QRA) as defined by the National Academy of Sciences and analysis of the 5 logical/methodological criteria (assumptions, consistency, completeness, coherence, consequences) for assessing examples of QRA and its methods.
24%	2.	Overview of Decision Theory and its use in QRA.
12%	3.	Natural Sciences/Engineering applications of QRA: Problems, Methods, and Solutions.
20%	4.	Biological Sciences Applications of QRA: Problems and Solutions.
10%	5.	Environmental-Justice Applications of QRA: Problems and Solutions.
12%	6.	Possible Methods for Improving QRA.

Study Sheets: For the midterm and final exams, the professor will give students study sheets (single-page) from which the exams will be taken.

Papers/Exams: There will be neither make-up tests nor acceptance of late papers unless the student notifies the professor, before the day and time of the test/deadline, and brings a doctor's note or an obituary as evidence of personal sickness or family death. On the papers, the professor will deduct points for all errors of spelling and grammar, as well as for logical, conceptual, and factual errors and for exceeding the page limits.

Format for Three Papers

Paper 1: (undergraduates) Find three quotations from the Starr and Whipple article in Science on QRA, and be sure these quotations are only 1 or 2 sentences. Label these quotations 1a, 2a, and 3a, respectively, and be sure to give the bibliographical citation and page number (e.g., Starr and Whipple, p. 136) for each quote. After each short quotation, state in one sentence an assumption that Starr and Whipple make in this quotation. The form of this sentence should be "Starr and Whipple assume that...." Number each of these assumptions 1b, 2b, 3b, respectively, and insert each of them after the quote on which they are based. Next after each assumption, write an argument sentence of the form "This assumption is doubtful because...." and use only one sentence. Each of these sentences should be numbered, respectively, 1c, 2c, 3c. The paper should be only one page, in order: 1a, 1b, 1c; 2a, 2b, 2c; and 3a, 3b, 3c. Double space between 1a-c, 2a-c, and 3a-c. Maximum length: 1 page.

Paper 1: Follow same format that undergraduates follow, except that (1)

(graduates)	you should analyze Harsanyi article on utilitarian decisionmaking, and (2) you may use quotes (and ellipses) up to 15 lines long. Thus, your paper should be 2 pages maximum.

Paper 2: (undergraduates and graduates)	Follow the same format for paper two as for undergraduate paper one, except that you should give 4 quotes, statements, arguments, not 3. Each item should be only one sentence. Also, instead of arguing that the QRA, ERA, or EIA author has made a controversial but correct (or incorrect) assumption, you can use one or more of the other logical criteria (consequences, assumptions, completeness, consistency, coherence) if you wish. Maximum length: 1 page.

Additional Extra-Credit Paper (for Undergraduates)

that is Required for All Graduate Students: Paper 3

1. Pick some current QRA—either a human-health QRA or an ecological ERA, and read it carefully to determine whether it makes implausible assumptions, is incomplete, is inconsistent, is incoherent, or leads to implausible consequences.

2. Follow the same format as for paper 2, but expand argument-sentences into argument-paragraphs. (Topic sentence of each argument paragraph should be your respective argument sentence.) Continue numbering system (1a, 1b, 1c, 1 d, etc. After each item 1c, 2c, 3c, and 4c, insert one sentence of the form: "To argument 1c, one could object that...because..." and number this sentence 1d, 2d, 3d, 4d, respectively. Then after each objection, insert a meaty paragraph that argues logically why the objection is correct or incorrect and why your original criticism was right. Do not merely repeat your original points. Five pages maximum.

3. Note: Those with chemical background might want to examine QRAs of chemicals, such as dioxin. Those with biological background might want to examine QRAs that are ecological risk assessments, e.g., of endangered species, habitat destruction, and so on. Those with engineering background might want to examine QRAs of engineering projects, e.g., for monitored retrievable storage of toxic waste.

Possible Topics for Third Paper

1. Calobrese and Baldwin, Hormesis: The Stimulatory Action of Sub-Inhibitory Amounts of Toxin, 1998, on reserve.

2. EPA, QRA on chlorine, 1995.

3. Faden et al., report on human radiation and other experiments, 1995.

4. any Ulanowicz article/chapter on thermodynamic models of ecological risk assessment.

Course Overview

DATE	CLASS CONTENT	ASSIGNMENT FOR THIS DATE
1-12-99 Tues.	1.1 Introduction to Quantitative Risk Assessment; Overview of Class. Examples of Yucca Mountain, EMAP, and Louisiana QRAs.	1.1 Read the first third of NAS. See "Environmental Racism and Biased Methods of Risk Assessment" in R.
1-14-99 Thurs.	1.2 Survey of logical fallacies to be avoided in class.	1.2 Read the second third of NAS.
1-19-99 Tues.	1.3 Analysis of the 5 logical criteria to be used in classroom analysis: assumptions, consistency, completeness, coherence, consequences.	1.3 Read the final third of NAS and "Value Judgments in the Three Stages of Risk Assessment" (58-65, RR) from the reader. See NRC, Understanding Risk selection from reader (R).
1-21-99 Thurs.	1.4 In-class analysis of NAS via the five logical criteria.	1.4 Critically evaluate NAS according to 5 logical criteria; see reading two, "Evaluating the Expertise of Experts."
1-26-99 Tues.	1.5 Critically evaluate Douglas and Wildavsky account of risk assessment.	1.5 Read Douglas and Wildavsky (pp. 54-73, 80-81, 186-198 of RC) from R and critically evaluate it.
1-28-99 Thurs.	1.6 Analysis of assumptions in Starr and Whipple.	1.6 Read Starr and Whipple from R (from Science) and find/evaluate 3 assumptions in their essay.
2-2-99 Tues.	2.1 Fundamentals of Decision Theory.	2.1 Read Chapters 1 and 2 in Resnik.

DATE	CLASS CONTENT	ASSIGNMENT FOR THIS DATE
2-4-99 Thurs.	2.3 Methods for Decisions Under Ignorance and Risk.	2.3 Read ch. 3 of Resnik.
2-9-99 Tues.	2.4 Decision Theory and Expected Utility. Turn in Paper 1.	2.4 Read ch. 4 of Resnik; start to think of QRA or ERA you want to evaluate.
2-11-99 Thurs.	2.5 Decision Theory and Utilitarian Rules.	2.5 Read Harsanyi article in R.
2-16-99 Tues.	2.6 Decision Theory and Maximin Rules.	2.6 Read Rawls article in R.
2-18-99 Thurs.	2.7 Rawls versus Harsanyi.	2.7 Read "Uncertainty and the Utilitarian Strategy" in R.
2-23-99 Tues.	3.1 QRA and the Yucca Mountain Repository.	3.1 Read pages 1-31, 161-185 of NAS, Yucca Report from reader.
2-25-99 Thurs.	Mid-Term Exam.	Study for Mid-Term Exam.
2-28-99 Sunday	Risk-Assessment Movie and Pizza at S-F home.	Relax and choose QRA to evaluate.
3-2-99 Tues.	3.2 QRA and the Yucca Mountain Repository.	3.2 Read Pigford (2) and Shrader-Frechette (1) essays from reader.

3-4-99 Thurs.	3.3 Was the NAS toxicologic assessment of Zinc-Cadmium Sulfide adequate?	3.3 Read 15 pp. Answers to Toxicologic Assessment by NAS in reader + NAS Summary + New Scientist article.
Week of 3-8-99	Spring Break	Relax.
DATE	CLASS CONTENT	ASSIGNMENT FOR THIS DATE
3-16-99 Tues.	4.1 Ecological Risk Assessment: the NAS Paradigm.	4.1 Read Orians and Mitchell in R.
3-18-99 Thurs.	4.2 Ecological Risk Assessment: the Reductionist Paradigm. Turn in paper 2.	4.2 Read Suter article and Suter-Loar essay in R. See NRC, Issues in Risk Assessment. Get current TA, QRA, EIA to critique for this class.
3-19-99	LAST DAY TO DROP	
3-23-99 Tues.	4.3 The Ecosystem Health Paradigm.	4.3 Read Rapport and Callicott in R.
3-25-99 Thurs.	RAPA meeting in Washington; 2-28-99 movie makes up for this class.	No assignment; no class.
3-30-99 Tues.	4.3 Ecological Risk Assessment: the Ecosystem Health and Integrity Paradigm.	4.3 Read Noss and S-F articles in reader (R).
4-1-99 Thurs.	4.4 Ecological Risk Assessment (ERA): the Index of Biotic Integrity.	4.4 Read Karr et al in R.

4-6-99 Tues.	4.5 Can one keep advocacy out of ERA and Conservation Biology?	4.5 Read Oelschlager, McCoy, Noss, S-F in R.
4-6-99 Tues.	Attend Ahearne lecture; 4 p.m.	Attend Ahearne lecture; he is a physicist and Director of Sigma Zi.
4-8-99 Thurs.	5.1 Environmental Justice and QRA of Three Mile Island. Turn in paper 3.	5.1 Read Freudenburg and Jones, plus "Metropolitan Edison v. the People" in R.
DATE	CLASS CONTENT	ASSIGNMENT FOR THIS DATE
4-13-99 Tues.	5.2 "	5.2 "
4-15-99 Thurs.	5.3 QRA, ERA, and Native Americans.	5.3 Read Sachs, Thorpe, Chino, and Shrader-Frechette in R.
4-20-99 Tues.	6.1 Does QRA suggest a Cancer Epidemic? Pro and Con.	6.1 Read Epstein, Whelan, and 2 Ames articles in R.
4-22-99 Thurs.	6.2 Should educated people become active in QRA disputes?	6.2 Read "An Apologia" in reader.
"	6.3 How ought one specify QRA Default Options?	6.3 Read selection from NRC, Science and Judgment, in R.
4-27-99 Tues.	No class today because of Ahearne lecture on 4-6-99 that makes up for this class.	Relax!