

University of Wisconsin Madison

AAE 706: APPLIED RISK ANALYSIS

3 credits

Spring Semester, 2021

Thomas F. Rutherford

Lectures

TTh 2:30-3:45pm, Soils Building (room 270)

Office Hours

Wednesday mornings (8:00 am - 10:00 am on Zoom)

and by appointment – rutherford@aae.wisc.edu

1 Instructional Information

Learning Objectives

The course focuses on the economics of risk and the role of risk in resource allocation. It covers conceptual as well as empirical analyses of economic behavior under risk and its implications for management and policy decisions. Special attention is given to the role of imperfect information in the decision-making process of private agents. Also, the importance of risk in the design and evaluation of public institutions is discussed. The course emphasizes economic applications exemplified in a series of homework assignments.

Upon completion of the course, students will have gained extensive knowledge about the economics of risk and practical experience about applied research examining private as well as public decision making related to risk management.

Prerequisites

The class has an intermediate microeconomics class as a prerequisite (AAE 635 or equivalent). Microeconomics will be used extensively in the economic evaluation of risk management.

The class also assumes statistical knowledge from at least one course in probability and statistics. Probabilities will be used extensively in the class as basic tools of risk assessment and risk analysis. The class will begin with a review of the relevant material in probability and statistics.

Required Material

Main Text for the Class: Chavas Jean-Paul. *Risk Analysis in Theory and Practice*. Elsevier Academic Press, New York, 2004. ISBN: 0121796214

Additional Readings will be assigned during the class. See Course URL (<https://canvas.wisc.edu/courses/227257>) for updates and announcements.

Course Requirements

- Attendance – Attendance in classes and discussion sessions is required.
- Assignments

Seven homework assignments will be given, amounting to about one homework every two weeks. The homework assignments are a very important part of the class. They have three objectives:

1. give the students a chance to refine their understanding of the analytical tools discussed in class
2. apply these tools to specific projects on the economics of risk
3. get practical experience in conducting applied research on the evaluation and management of risk.

Each homework will cover a different part of the class. All assignments will involve conducting applied research on risk analysis. Each homework consists in analyzing data with the goal of evaluating specific risky projects, assessing the economic implications of risk and making recommendations to decision makers. Each homework can be done using either Excel or the GAMS mathematical modeling language for which a student license will be provided.

Students may work alone or in pairs on homework assignments, however, individual reports are required. N.B. You may only work with a specific other student *once* during the term. The reports should be typeset. They should be well written and well presented. Each report is to be printed and submitted on their due date. Late homework submission will receive a 5 percent deduction per day.

Each homework assignment will be evaluated based on the following criteria

- Presentation: (5 percent)
- Motivation: What are the economic questions being addressed? (5 percent)
- Methodology: Which model is being used in the analysis? (30 points)
- Findings: What are the empirical results of the analysis? (40 points)
- Interpretation of the results: What are the implications of the findings for risk management? Why are the results interesting? (20 points)

- Exams

There will be ONE EXAM given at the end of the semester (no final exam). The exam will cover all the material discussed in class. The exam questions will be closely related to the homework assignments. The exam date will be set to accommodate all students.

2 Grading

The grading will rely on the seven homework assignments and the exam.

The following grading scheme will be used:

- Homework: 60 percent of the final grade
- Exam: 40 percent of the final grade
- Final grade (out of 100 points): A: 92-100; AB: 85-92; B: 78-85; BC: 71-78; C: 64-71; D: 57-64

3 Course Organization and Topics

1. The modeling of economic behavior under risk: (4 weeks)

- the measurement of risk
 - the expected utility hypothesis
 - the measurement of risk preferences:
 - absolute and relative risk aversion
 - the risk premium
 - the nature of risk aversion: the decreasing absolute risk aversion hypothesis
 - stochastic dominance
 - mean-variance models
2. The economics of private risk bearing: (4 weeks)
- production decisions under risk
 - diversification strategies
 - portfolio selection and capital-asset pricing
3. Risk in a multi-period framework: (3 weeks)
- the value of information
 - the cost of information
 - learning and the demand for information
4. Public policy and risk allocation (4 weeks)
- greenhouse gas mitigation – buying greenhouse insurance
 - climate change adaptation – agricultural decision with a changing climate.
 - insurance and the efficiency of risk allocation
 - contract design under imperfect information

4 Other information

Plagiarism

Plagiarism is a serious offense. All sources and assistance used in preparing your papers must be precisely and explicitly acknowledged. Ignorance of what constitutes plagiarism or academic misconduct is not a defense. It is your responsibility to be sure. The web creates special risks. Cutting and pasting even a few words from a web page or paraphrasing material without a reference constitutes plagiarism. If you are not sure how to refer to something you find on the internet, you can always give the URL. It is generally better to quote than to paraphrase from material on the web, because in the absence of page numbers it can be hard to find passages that are paraphrased rather than quoted. For more information on writing and source citation, the following may be helpful <http://writing.wisc.edu/Handbook/Documentation.html>

Academic Integrity

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct comprises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. If you have any questions about

what constitutes academic misconduct, please read the following information
<http://students.wisc.edu/doso/acadintegrit.html> or come talk with one of the instructors.

Accommodations for students with disabilities

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA. <http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php>