



THE OHIO STATE UNIVERSITY

JOHN GLENN COLLEGE OF PUBLIC AFFAIRS

Risk & Decision Analysis

Spring 2016

Public Affairs 5881/City & Regional Planning 5880

Mon. & Wed. 4:10-5:30PM–Page Hall 240

Professor

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Office Hours

Time: TBD

Place: Page Hall 210Q

Or by appointment

Professor

Kara Morgan, Ph.D.

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Office Hours

Time: Tuesdays and Thursdays 12-1

Place: by phone

Or by appointment

Course Description:

Today, more than ever, managers are required to make decisions in turbulent and uncertain environments. Intended for advanced undergraduates and graduate students, this course will provide a comprehensive assessment of theories and tools for decision-making in the face of risk and uncertainty. It will provide a rigorous treatment of current issues and approaches in risk analysis through both qualitative and quantitative lenses. The methodological focus of the course will be on analytical approaches and modeling methodologies to improve and enhance decision-making in the face of uncertainty. While the course focuses on issues of relevance to the public and non-profit sectors, the tools, theories and approaches learned are widely applicable to other applications and sectors. This course builds upon students' prior academic preparation in case study analysis, statistics or econometrics, and data analysis using software packages.

Course Objectives:

Upon successful completion of the course, students will have gained a basic understanding of core concepts, methods and theories in risk and decision analysis. Students who successfully complete the course should be able to:

- Understand core issues and biases inherent to the decision-making process
- Formulate objectives and outcomes in analyzing risk
- Effectively chart decisions with uncertainties using tools such as decision trees
- Model uncertainty using Monte Carlo approaches and other techniques, interpret modeling results, and perform sensitivity analysis
- Comprehend and critically evaluate arguments made in public policy applications
- Apply the basic concepts learned in the class to other courses taken in the student's field(s) of study.

Course Format:

Classes will meet for lecture and discussion on Monday and Wednesday afternoons at the times listed above. The class schedule will observe university-scheduled holidays, including Martin Luther King, Jr. Day (see lecture schedule below).

The course is designed as a series of six blocks, or units. Each block consists of approximately two weeks of course meetings that focus on a general learning theme in risk and decision analysis. These blocks are intended to integrate theory, methods, software and tools. In this way, students should gain the skillset to both understand the issues and concepts and also be able to develop an approach to measure, analyze or simulate the risk environment to make more informed decisions.

Each block or unit is broken down into four separate components that align with each of the four lecture days of the two-week unit. First, each block begins with a lecture that introduces the theory and provides the terminology and the conceptual framework for the learning theme of the block. Second, each block includes a primer that provides the theoretical background for the empirical tools that will be utilized in that block. These will include primers on probability theory and statistics, etc. Third, each block includes a case study analysis in which students will be guided through the application of a case that applies to the learning theme. And fourth, each block will include a lab day in which the software and analytical approach will be developed and integrated with the case and theoretical concepts developed earlier in the block. The themes of the blocks are 1) Elements of Decisions; 2) Structuring Decisions; 3) Organizational Decision-making; 4) Expert Elicitation and Subjective Probabilities; 5) Risk Attitudes & Heuristics, and 6) Multi-attribute Models. The lessons and concepts learned will build upon each other and will extend beyond the individual theme or block in which they are introduced.

Deliverables from each of the six blocks will constitute the core evaluative portion of the course. These deliverables will be in the form of policy briefs, written to a specific client to advise them on decision-making in the risk environment provided in the lab and/or case study. These briefs will be approximately five single spaced pages each and will require integration of theory, tools, methods and software in order to successfully inform the decision-maker. In this way, students will also gain additional exposure to, and practice with, professional writing in an applied context. Grading rubrics will be provided with each bi-weekly policy brief. Students are permitted to work with partners on briefs, and students can also work individually if they so choose. Note, students who choose to work with partners will receive one grade for both students. Briefs are due by 5pm (C.O.B.) by email on the day that they are due (email both instructors).

Students will also be required to write an individual risk and decision analysis paper that will constitute a term paper for the course. This paper will be due on the day of the final exam, on May 1, by 5pm. Guidelines for this paper and a grading rubric are provided in the Risk and Decision Analysis Term Paper Guidelines document. The paper should be approximately fifteen double-spaced pages in length, excluding any appendices or supplemental tables or figures from sensitivity analyses, etc. The paper can, but does not need to, build upon one of the six policy briefs. Students should submit both a printed paper copy and an electronic copy in MS Word format. The electronic copy should be emailed to both instructors by the start of class on the day that it is due.

Students will also be required to present the work from their final paper in the form of a professional presentation of approximately ten to fifteen minutes in length. Presentations will require that you distill the methods, theories and applications of your analyses down to poignant, understandable (if executives) and concise explanations for a decision-maker who will be informed by your analyses and recommendations. Guidelines and rubric for the presentation are provided in the Final Paper Presentation Guidelines and Rubric document.

Finally, students are required to be active participants in class. While some classes naturally lend themselves to less discussion due to more targeted lecture content, some are improved through active student participation and active integration of theories, tools, methods and cases into the class discussion. To this end, students are expected to complete the assigned readings prior to class and be ready to discuss. Students are also expected to attend paper presentations of their colleagues in this course, and actively participate in the discussion of their colleagues' paper presentations. Well-prepared students are students who have completed the reading prior to class, attend class on time, and participate in the class discussion. Students who regularly attend lecture and participate in discussions, tend to be students who get the most from the course material.

In addition to regular participation, which includes having done the reading, responding to questions and offering comments during class, students will each be assigned to present one of the cases to the class. Case presentations will be graded based upon the Case Presentation rubric. The rubric will provide guidelines on the materials that the student should present from the case. These will follow the decision template that will be presented in the first week of class. Students are encouraged to seek out additional readings on the topic and incorporate those into their presentation. Students will not be graded on the professionalism of their presentation of the case, but rather on the thoroughness and detail of their content. Case study presentations will be worth a total of 20 points, from the total of 50 participation points for the course. Finally, attendance at all the sessions with the student presentations (not just the one you are presenting in) will be worth 5 of the 50 points.

Course Texts:

Clemen, Robert T. and Terence Reilly. 2014. *Making Hard Decisions: With Decision Tools*. Mason, Ohio: South-Western Cengage Learning Press. ISBN-13: 978-0-538-79757-3

Note that this book was designed for a business school class, and therefore, the chapters we are using have some content that we will not cover. We will provide you with specific page numbers of the most critical parts of each chapter the week before the reading is due.

Other readings provided on course website.

Higher Education Opportunity Act (HEOA) Statement:

Students can access textbook information via the Barnes & Noble bookstore website: www.shopOhioState.com as well as from their Buckeye Link Student Center. This information is disseminated by B&N to all area bookstores. You may buy from a store of your choice and/or shop for books (always use ISBN# for searches) on line.

Course Website:

The class website will be provided via Ohio State University's Carmen system, at <https://carmen.osu.edu/>. Students are required to check Carmen regularly for class announcements, updates, etc.

Course Requirements, Grading and Evaluation:

Student course grades will be based upon performance on graded assignments, presentation and participation. Final course grades will be based upon the following point scale.

| <u>Assignment</u> | <u>Points</u> |
|--|-------------------|
| Risk & Decision Analysis Policy Briefs (1-6) | 50 pts (each) |
| Risk & Decision Analysis Final Paper | 100 |
| Risk & Decision Analysis Paper Presentation | 50 |
| Participation | 50 |
| TOTAL | 500 Points |

The following letter grade scale will be applied for purposes of providing the final semester grade:

| Points | Percentage | Grade | Points | Percentage | Grade |
|--------|------------|-------|--------|------------|-------|
| 465 | 93 | A | | | |
| 450 | 90 | A- | 365 | 73 | C |
| 435 | 87 | B+ | 350 | 70 | C- |
| 415 | 83 | B | 335 | 67 | D+ |
| 400 | 80 | B- | 300 | 60 | D |
| 350 | 77 | C+ | | | E |

The professor may also offer extra credit opportunities, not listed. These may include participation in a learning activity outside of class such as an experiment or another enrichment activity.

Policy on Grading Disputes:

Your professors understand that grading errors, mistakes, and omissions can occur. To facilitate an orderly and respectful process for the settlement of grading disputes, students must notify both professors of the dispute in writing within one week of the returned assignment. The preferred method for submitting grading disputes is electronic mail (email addresses provided above). The written correspondence should detail the reason for the dispute.

Risk & Decision Analysis Policy Brief Submission Protocols:

Policy Briefs are due by C.O.B. on the day that they are due (5pm EST/EDT). You are to submit them electronically using e-mail and you are to email both instructors with your brief attached, at the email addresses provided on the first page of the syllabus.

Briefs will be accepted late, up to 1 week late, for extenuating and approved circumstances. Late briefs will receive a 50 percent grade reduction (minus 25 points).

Risk & Decision Analysis Paper:

Proposals for the Topic of the Risk & Decision Analysis paper will be due on Wednesday, March 9. The requirements for the proposal will be described in the Risk and Decision Analysis Term Paper Guidelines document. The professors will provide feedback on the proposals by Monday, March 21. If the proposal is not accepted, the student will need to submit a revised proposal and have it approved before beginning work on the paper.

Class Policy on Collaboration:

Your professors consider collaboration with anyone on a graded assignment to be a violation of the class policy on originality, with one exception. As mentioned earlier, students are permitted to collaborate with a partner on Risk & Decision Analysis Policy Briefs. Partners who work together will submit one brief and one grade will be assigned. Only two students may work together on a brief. You do not need to have the same partner for all briefs – and you can submit some with partners and some solo. Students who collaborate are fully responsible for any errors or omissions in the submitted work. Outside of this partnership on policy briefs, collaboration on assignments and information sharing outside of class constitutes a violation of the policy on originality.

Class Policy on Originality

Plagiarism is defined as the submission of material authored by another person but represented as the student's own work, whether that material is paraphrased or copied in verbatim or near-verbatim form. This includes the improper acknowledgment of sources in essays or papers. Culpability is not diminished when plagiarism occurs in drafts which are not the final version.

The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's [Code of Student Conduct](#), and that all students will complete all academic and scholarly assignments with fairness and honesty. Failure to follow the rules and guidelines established in the University's Code of Student Conduct may constitute "Academic Misconduct." Sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

Originality means that the student is the sole author of the work. Thoughts and ideas taken from other sources or from official content are permitted, but this must not constitute the bulk of the student's submission. This means that it is not acceptable for a student to simply submit work completed by another person or institution (such as an online paper purchasing site) and cite it as the source of the work. A student's work must be his/her own. Students are encouraged to see the OSU Code of Student Conduct, Section 3335-23-04 that defines academic misconduct further. Ignorance of the University's Code of Student Conduct is never considered an "excuse" for academic misconduct.

Cases of cheating or academic dishonesty will be promptly reported to the university committee on academic misconduct. They will be handled according to university policy:

http://studentaffairs.osu.edu/resource_csc.asp

Other sources of information on academic misconduct (integrity) to which you can refer include:

The Committee on Academic Misconduct web page: <http://oaa.osu.edu/coam.html>

Ten Suggestions for Preserving Academic Integrity: <http://oaa.osu.edu/coamtensuggestions.html>

Eight Cardinal Rules of Academic Integrity: www.northwestern.edu/uacc/8cards.html

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact your professor.

Disability:

Students requiring disability accommodation should contact the Ohio State University Office of Student Life's Disability Student Services office.

Office of Disability Services

The Ohio State University
Office of Student Life
150 Pomerene Hall
1760 Neil Avenue

Website: <http://ods.osu.edu/>

Email: ods@studentlife.osu.edu

Exam Accommodations:

odsexam@osu.edu

Phone: 614-292-3307

Fax: 614-292-4190

Students with disabilities are responsible for making their needs known and for seeking the available assistance in a timely manner. This material is available in alternative formats upon request. The Office of Disability Services provides assistance in verifying the need for accommodations and developing accommodation strategies. Disabled students who have not previously contacted the Office of Disability Services are encouraged to do so.

Mental Health Statement:

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know is suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the **Office of Student Life Counseling and Consultation Services (CCS)** by visiting ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 4th Floor of the PAES Building. 24 hour emergency help is also available through the National 24/7 Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org

Helpful Resources:

Statistical Consulting: Students wishing to have additional help with the statistical analysis for their papers may consult with the Statistical Consulting Service (www.scs.osu.edu/) and enroll in their Stat 5700 course (<http://www.scs.osu.edu/stat5760.html>).

Writing Consulting: Students wishing to have additional help with the writing of their papers can meet with a consultant at the Writing Center (<https://cstw.osu.edu/writing-center>).

Library Assistance: The Glenn College has a dedicated librarian at OSU Libraries, David Lincove (lincove.1@osu.edu), who can help provide research assistance. For more information and links to some common public affairs resources, see - <http://go.osu.edu/8gx>.

Syllabus Revision:

During the course of the semester, your professors will regularly review student progress and may revise the syllabus to meet class needs if necessary. This may result in due dates being extended or adjustments in course content, etc. Students will be given advance notice of any changes that are made to the course.

SAMPLE

Course Schedule:

| Week | Date | Topic | Readings | Homework Assignments (due) |
|------|--------|--|-------------------|-----------------------------|
| 1 | Jan 11 | Welcome, introductions, course format, website, and expectations. Risk and Decision Analysis Pre-diagnostic. | | Policy Brief #1 (Feb 3) |
| | Jan 13 | Elements of Decisions | C&R Ch. 1-2 | |
| 2 | Jan 18 | MLK Jr. Day | | |
| | Jan 20 | Primer- Statistical/probability theory for risk and decision-making | C&R Ch. 7 | |
| 3 | Jan 25 | Case - Housing/Homelessness Policies | TBD | |
| | Jan 27 | Risk Analysis Lab 1- Statistical and Probability Theory for Decision-Making | | |
| 4 | Feb 1 | Structuring Decisions | C&R Ch. 3 | Policy Brief #2 (Feb 17) |
| | Feb 3 | Primer- Decision Trees for Risk and Decision Analysis | C&R Ch. 4 | |
| 5 | Feb 8 | Case - Evacuation from Radiological Exposure | TBD | |
| | Feb 10 | Risk Analysis Lab 2- Precision Tree© | | |
| 6 | Feb 15 | Organizational Decision-Making | C&R Ch. 6 | Policy Brief #3 (Mar 2) |
| | Feb 17 | Primer- Sensitivity Analysis | C&R Ch. 5 | |
| 7 | Feb 22 | Case - Mercury and Seafood | TBD | |
| | Feb 24 | Risk Analysis Lab 3- Precision Tree© | | |
| 8 | Feb 29 | Expert Elicitation & Subjective Probabilities | C&R Ch. 8 | Policy Brief #4 (Mar 23) |
| | Mar 2 | Primer- Probability Distributions | C&R Ch. 9 | |
| 9 | Mar 7 | Case - Infrastructure for Emergency Response (Hurricane Katrina/Sandy) | TBD | |
| | Mar 9 | Risk Analysis Lab 4- Data Analysis with @Risk© | C&R Ch. 10 | |
| | Mar 14 | Spring Break | | |
| | Mar 16 | | | |
| 10 | Mar 21 | Primer- Probability Distributions and Simulation with @Risk© | C&R Ch. 11 | Policy Brief #5 (Apr 6) |
| | Mar 23 | Case -Foodborne Illness (tentative) | TBD | |
| 11 | Mar 28 | Risk Attitudes & Heuristics (Note: order of lecture and primer switched this week) | C&R Ch. 14-15 | |
| | Mar 30 | Risk Analysis Lab 5- Data Analysis with Probability Distributions using @Risk | | |
| 12 | Apr 4 | Multi-attribute Models | C&R Ch. 16 & 17 | Policy Brief #6 (Apr 13) |
| | Apr 6 | Primer- Programming your own simulation using VBA | Selected readings | |
| 13 | Apr 11 | Case - Ecological Restoration | TBD | |
| | Apr 13 | Risk Analysis Lab 6- Risk Analysis with Custom-made Software | | |
| 14 | Apr 18 | Student Paper Presentations | | |
| | Apr 20 | Student Paper Presentations | | |
| 15 | Apr 25 | Student Paper Presentations. Risk and Decision-Analysis Post-Diagnostic | | |
| | May 1 | Final Papers Due | | |