

RISK ANALYTICS AND BEHAVIORAL SCIENCE
RMI 660
University of Wisconsin, Madison
Wisconsin School of Business
Spring 2021

CONTACT INFORMATION:

Instructor: Professor Justin Sydnor, PhD
Office: [Not routinely on campus this semester due to COVID-19]
Email: Justin.sydnor@wisc.edu
Course website: <https://canvas.wisc.edu/courses/243752>
Office hours: Zoom: Tuesdays 9:00 – 10:00 a.m. and Fridays 4:00 – 5:00 p.m. or appointment.
Lecture: Zoom: M/W 1:00 – 2:15 & 2:30 – 3:45

ZOOM MEETING INFORMATION:

***Note:** You are welcome to attend either Lecture Session, regardless of which one you are registered for. The zoom environment gives us flexibility, so I am fine if you use that. Also, I realize that the current environment involves uncertainties that may sometimes make it difficult to attend lecture. I will be recording the lecture sessions and posting them. I will not be taking attendance during lecture. However, I **strongly** advise you to routinely attend one of the live lecture sessions. I designs this sections to be interactive and thought-provoking. It is extremely hard to get the full learning experience if you are only watching the recordings afterward.*

Please also note that I have two separate zoom sessions setup for the lecture sections. This allows me to keep the chat streams separate and gives me the ability to close the first room before I start the second lecture session.

The zoom links are available on the canvas course site. Please review and make sure you have access prior to the first lecture sessions.

PIAZZA DISCUSSION BOARD:

This term we will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates and myself. Rather than emailing questions to me, please post your questions on Piazza.

Find our class signup link at: <https://piazza.com/wisc/spring2021/sp21rmi660002>

There is also a link to piazza on the course navigation on the left side of our canvas site.

COURSE DESCRIPTION:

Learning to effectively navigate uncertainty is a key issue for all areas of business and especially for those engaged in explicit risk-management activities. The skills for success in these environments include knowing how to formulate the right questions to ask, how to identify the information that is valuable for answering those questions, understanding how to process incoming information to distinguish signal from noise, and how to use that information to put structure to uncertain environments so that one can take

good calculated risks. This collective set of skills are at the heart of “decision analysis”, which is a structured rational approach to making decisions under uncertainty.

However, navigating uncertainty and engaging in proper decision analysis are inherently challenging because humans have a range of systematic decision and information-processing biases. Our psychological and emotional reactions to outcomes can easily get in the way of making decisions that best address our stated objectives. We also have not evolved to be particularly good intuitive statisticians and often make inferences from observations of random events that are not in line with statistical principles or logical reasoning. Finally, at a basic level, early in our careers most of us have little experience with making decisions in highly ambiguous environments and need to practice the inquisitive and critical-thinking processes needed to operate in these environments.

This course will help you build a foundation for rational decision analysis and more thoughtful decision-making under uncertainty. We will develop an awareness of key human tendencies that affect our ability to process information and make decisions. We will also develop risk-analytics techniques that are useful for helping to overcome these biases and for structuring decision analysis.

NUMBER OF CREDITS AND CREDIT JUSTIFICATION:

This is a 3-credit course. We will meet for 150 minutes of classroom instruction and discussion each week throughout the semester. In addition, there will be an expected average workload of approximately 6-hours per week of readings and assignments throughout the semester. Students should expect that the average workload will vary somewhat from week to week reflecting due dates graded material.

STUDENT LEARNING OUTCOMES:

At the end of this course you should be able to...

- Recognize situations where potential biases in perceptions, understanding, and decisions related to risk management are likely to arise.
- Articulate the behavioral factors and psychological processes that may generate bias in that situation.
- Employ appropriate decision/evaluation process and business analytics to help improve decisions in the face of potential bias. These techniques include Monte Carlo Simulation, Decision Tree Analysis, and Expected Value Maximization.

COURSE TOPICS AND SCHEDULE:

We will divide the 14-week semester for the course into 5 units with a couple of key topics within each unit. The first four units will have a week each dedicated to developing analytic skills with an analytics assignment tied to each of those weeks.

Unit 1: Introduction to Decision Analysis

Week 1: Course introduction, decision-analysis framework, introduction to the 2-system model.

Week 2: Outcome vs. Decision focus, outcome bias and hindsight bias.

Week 3: Analytics Methods: Decision trees and expected-value calculations. [Homework 1]

Unit 2: Biases in Valuing Outcomes

Week 4: Reference dependence, loss aversion, and framing.

Week 5: Mental accounting, diminishing sensitivity, probability weighting.

Week 6: Analytics Methods: Monte Carlo simulations to evaluate aggregated risk. [Homework 2]

Unit 3: Biases in Assessing Risk

Week 7: Knighting uncertainty vs. risk, availability & anchoring, affect heuristic.

Week 8: Overview of structured risk-assessment techniques.

Week 9: Analytics Methods: Distribution fitting & prediction-model evaluations. [Homework 3]

Unit 4: Biases in Reacting to New Information

Week 10: Base rates and Bayesian reasoning.

Week 11: Overreactions to random variation and system neglect.

Week 12: Analytics Methods: Monte Carlo to benchmark randomness; Bayesian updates. [Homework 4]

Unit 5: Biases and Blindspots in Acquiring Information

Week 13: Overconfidence and confirmation bias, techniques for the outside view.

Week 14: Strategic uncertainty, (behavioral) game theory.

READINGS AND REQUIRED MATERIALS:

Required Text: “Thinking Fast and Slow” by Daniel Kahneman. Available from Amazon.com and other book sellers (paperback or kindle version recommended)

Required Course Pack: HBS course pack with one reading and one case study. Please purchase the course pack for \$8.50 here: <https://hbsp.harvard.edu/import/797424>

Additional readings: Additional readings from a range of business, academic, and popular sources will be posted to the course site.

GRADED COURSE REQUIREMENTS:

Engaged learning assignments: There will be regular “engaged learning” assignments due on Sunday and Tuesday nights. They will be submitted online via the canvas site prior to lecture sections. The purpose of these assignments is to encourage active engagement with course materials *prior* to our group sections so that we can have more in-depth and engaged class sections. Examples will include reaction questions to readings, survey questions, and demonstration of familiarity with basic analytics

procedures. These will be graded for participation. However, credit will be reduced or eliminated if it is clear a true effort was not made.

Risk analytics homework assignments: There will be 4 risk-analytics assignments using Excel. These assignments will develop your ability to use decision trees and simulations to support sound decision analysis. The homework assignments will be graded for correctness. You are allowed to work with other students on these assignments, but each student must submit their own work and you are required to do your own spreadsheet analysis and own write-up of results.

Homework Due Dates:

- HW1 Decision Trees: Monday February 15th by 10:30 a.m.
- HW2 Monte Carlo & Risk Aggregation: Monday March 8th by 10:30 a.m.
- HW3 Distributions & Assessing Predictions: Monday March 29th by 10:30 a.m.
- HW4 Bayesian Trees & Monte Carlo: Monday April 19th by 10:30 a.m.

Unit exams: There will be a take-home open-note essay and short-answer exam for each of the 5 units in the course. These unit-exams will replace the standard midterm/final structure. These will be graded for correctness. You are required to complete these exams on your own with no input from others (very much including no contact or discussions with other students in the course).

Unit Exam Due Dates:

- Unit 1: Monday February 8th by 10:30 a.m.
- Unit 2: Monday March 1st by 10:30 a.m.
- Unit 3: Monday March 22nd by 10:30 a.m.
- Unit 4: Monday April 12th by 10:30 a.m.
- Unit 5: Friday May 7th by 7:05 p.m.

Graduate Students other than MSBA (MBA, MACC) Additional Group Project Assessing Apparent Risk Management Failure:

For all MBA students in the course there is an additional requirement to submit a 5-7 page report on an apparent risk management failure in an organization. This report will draw on the lessons throughout the semester and will help assess an apparent risk-management failure by a company that you can learn about in the news. You will do this project in groups of 3 and will turn the report in by Friday May 7th. More details will be posted on the course site during the semester.

MSBA Students Additional Individual Project Benchmarking Randomness with Monte Carlo Simulations:

For all MSBA students enrolled in the course you have an additional final project for the course to conduct a Monte Carlo analysis to benchmark random variation for an outcome of interest. This project will build on the ideas in Homework 4. This project gives you an opportunity to develop your ability to identify an interesting question where simulations can be useful, to conduct your own analysis, and to present it in a well-formatted business memo. You will hand this in as an individual assignment by Friday May 7th. More details will be posted on the course site during the semester.

GRADE WEIGHTING:

The grade weighting for the course is slightly different for undergraduate students and graduate students. Please refer to the appropriate table for your situation.

Undergraduate

Engaged learning assignments (participation):	25%
Risk analytics homework assignments:	25%
Unit exams	50%

MSBA students

Engaged learning assignments (participation):	25%
Risk analytics homework assignments:	25%
Unit exams	40%
Monte Carlo Benchmarking Final Project	10%

Other graduate students (e.g., MBA, MACC)

Engaged learning assignments (participation):	25%
Risk analytics homework assignments:	20%
Unit exams	40%
Group final report	15%

GRADING CUTOFFS:

A:	92%+
AB:	89% - 91%
B:	82% - 88%
BC:	79% - 81%
C:	70% - 78%
D:	60% - 69%
F:	59% and below.

Grading cutoffs may be revised downward at instructor discretion, but will not be revised upward.

POLICIES ON MISSED/LATE ASSIGNMENTS AND EXAMS:

Engaged learning assignments have due dates prior to class in most cases and will not be accepted late. I will drop the lowest engaged learning score (i.e., one free pass) for everyone.

For risk analytics assignment and unit exams: I will deduct 10% for submissions within 12 hours of the due date. For submissions between 12 hours and 36 hours late, I will deduct 50%. No credit for submissions more than 36 hours late.

Special note on illness: This semester during the COVID-19 pandemic is an unusual period and I realize there may be difficult circumstances with personal and/or family illnesses. Please just communicate with me openly and honestly about these situations and I will do my best to accommodate and make arrangements as needed.

ATTENDANCE POLICY:

I encourage regular attendance in the live lecture sessions. I will not “take attendance” or grade attendance. However, active participation in class will be used as a subjective criteria for bumping up the grade of those whose final class score falls just below a grade cutoff.

NOTE TAKING AND SLIDES:

I will post slides used during the zoom lecture sessions. However, I will not distribute the slides ahead of time. I strongly encourage you to take your own notes during the sessions and to use lecture recordings only as a supplement. There is a lot of value in the act of personal note taking and synthesizing material.

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 compromises 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 Dean of Students Office for additional review.

Dean of Students: <https://www.students.wisc.edu/doso/academic-integrity/>

WSB Honor Code: <https://bus.wisc.edu/about-us/commitment-to-ethics/honor-code>

ACCOMODATIONS 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.

WISCONSIN SCHOOL OF BUSINESS COMMITMENT TO DIVERSITY:

Diversity and inclusion are core values of the Wisconsin School of Business. We believe in the importance of learning from others whose experiences and perspectives differ from our own. Students, faculty and staff are expected to embody inclusive behaviors that create an exemplary learning community for all.

If you would like to learn more, or have suggestions for how we can improve the climate for learning, please contact me or the Director of Diversity and Inclusion, Binu Hill at binu.palta.hill@wisc.edu, 263-3462, 4250 Grainger Hall.