UNIVERSITY OF ARKANSAS

OMGT 5793/GNEG 590V/EMGT 514V – Risk Management
Syllabus

Session 2: Spring 2020 8W2, March 4 – April 30, 2020

Schedule: Online, asynchronous

Instructor:
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(210) 471-8040 (Eastern Time)

MSEM/MSOM Students:
Welcome to class! There are no specific pre-requisites for this course, but be advised we meet the criteria for a Master's in Engineering degree. This means we assume a fairly high level of Excel skills, and our homework sets use calculus. References for these skills will be provided if you need a refresher, but come prepared to integrate e^x, write your own Monte Carlo simulations from scratch, fluently write quantities in scientific notation, and work with some widely varied statistical distributions. Not all risk is normally distributed.

Course Description:
Students will learn to apply tools to identify, assess, communicate and manage risk. Course work includes methods to identify risks, develop risk models, assess risk, and evaluate risk management options.   Case studies are used to understand risk management challenges in systems development in complex organizations.

Required Textbooks:
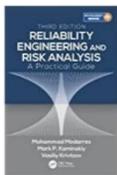
Reliability Engineering and Risk Analysis: A Practical Guide, Third Edition, by Mohammad Modarres and Mark P. Kaminskiy, 2016.   ISBN 978-1498745871.   Modarres is a truly prolific writer, so make sure you get the book with the cover that looks like the image on the left.

The following required readings will be placed on reserve for you and made available to you online through the University Library.

- Cox, Tony. What's Wrong with Risk Matrices? Risk Analysis, Vol. 28, No. 2, 2008, p. 497-512.

- Murphy, Dean, and M. Elisabeth Pate-Cornell, The SAM Framework: Modeling the Effects of Management Factors on Human Behavior in Risk Analysis. Risk Analysis, Vol 16, No. 4, August 1996, p. 501-551.
- Pinto, Ariel and Magpili, Luna. Chapter 19: Risk Management, p. 317-335, in The Engineering Management Handbook, American Society for Engineering Management, 2nd edition, edited by John Farr, S. Jimmy Gandhi, and Donald N. Merino. ISBN 978-0997519501.
- Abkowitz, Mark D. Operational Risk Management: A Case Study Approach to Effective Planning and Response, Wiley and Sons, Hoboken, NJ, 2008. ISBN 978-0470256985.
- Hubbard, Douglas. The Failure of Risk Management: Why It's Broken and How To Fix It.

Optional Further Reading:
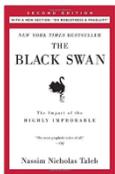
The Black Swan: Second Edition: The Impact of the Highly Improbable, by Nassim Nicholas Taleb. ISBN 978-0812973815.
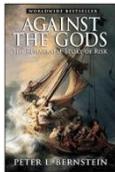
Against the Gods: Against the Gods: The Remarkable Story of Risk, by Peter L. Bernstein. ISBN 978-0471295631.

Set Phasers on Stun: And Other True Tales of Design, Technology, and Human Error, by Steven Casey, 1998. ISBN 978-0963617880.

Required Software:

Good news! Your enrollment here at the University of Arkansas entitles you to a free copy of Microsoft Office 365, which includes **Excel 2016 (and is updated every year)**. You will need Excel 2013 or later for this class. You can download your copy of Office at https://techarticles.uark.edu/microsoft/office/. Versions from 2010 or earlier will not allow successful completion of this course.

We will be installing a free Excel add-in called SIPMath from Probability Management, Inc. (www.probabilitymanagement.org) and using that to run our simulation homework.

You will also need the ability to compose papers using a word processor, and the ability to record a webcam video of yourself for the class presentation.

Course Goals / Objectives:

- CO 1 - Understand the sources of risk in engineering management.
- CO 2 - Develop a risk management plan for an engineering organization.
- CO 3 - Apply risk models to solve complex engineering management problems.
- CO 4 - Create and apply system analysis models to assess system risk.
- CO 5 - Develop executive summaries and technical reports for decision makers to communicate solutions to complex technical issues.

Course Requirements:

Description	Total Points	Percent of Grade
Graded Homework and quizzes (30-50 points a week)	250	25%
Class Project (Oral Presentation)	100	10%
Exam #1 – Midterm	300	30%
Exam #2 – Final Exam	350	35%
TOTAL	1000	100%

Evaluation Procedures:

Grade	Percentage
A	90 – 100%
B	80 – 89%
C	70 – 79%
D	60 – 69%
F	0 – 59%

Attendance Requirements:

This is an asynchronous online course, which means there are no specific attendance hours. You can structure your participation around your work and family obligations. Students are expected to submit weekly quizzes and homework assignments on time, and take the proficiency exam within the time window.

If you need to make up work due to unforeseen absences, please contact the professor.

You are welcome to work ahead if you like.

Course Units / Calendar:

Week / Due Date	Reading	Homework	Points
Week 0 **March 11**	• Course Syllabus	Before class – a little bit of setup activity (you can do this Week 1 as well) • 0.1 Academic Integrity Acknowledgment • 0.2 Download Excel • 0.3 SIPmath Assignment • 0.4 Meet your Classmates Blog •	30
Week 1 **March 11**	1. Modarres Chapter 1 – Reliability Engineering 2. Modarres Chapter 2.1 – 2.4 – Probability and Statistics Review 3. Murphy and Pate-Cornell, SAM Framework 4. Hubbard, Chapter 1 - What Failure Means 5. Hubbard, Chapter 2 - Risk Management History	• 1.1 Modarres Homework • 1.2 SIPmath quiz • 1.3 Hubbard Discussion Post • 1.4 SAM Discussion Post	40
Week 2 **March 18**	1. Modarres Chapter 4.1 – Reliability Blocks, MTBF, MTTF 2. Modarres Chapter 4.2 – Fault tree, logic tree, success tree 3. Modarres Chapter 4.3 – Event tree 4. Hubbard Chapter 9 - Monte Carlo Simulation 5. Case Study: Stanford Linear Accelerator Risk Management Plan 6. Case Study: Hyatt Regency Walkway Collapse (Abkowitz)	• 2.1 Modarres Homework • 2.2 Heiser/Render & Modarres Homework • 2.3 SIPmath quiz • 2.4 SIPmath and Prob 4.3 • 2.5 Hubbard Discussion • 2.6 SLAC Discussion • 2.7 ORM Discussion	50
Week 3 **March 25**	1. Modarres Chapter 2.5 – 2.7 – Parameter estimation and hypothesis testing. Point estimation, MLE, Interval estimation, Bayesian estimation, frequency tables, Goodness of Fit tests. 2. Hubbard Chapter 6 - The Limits of Expert Knowledge (parameter estimation pitfalls, overconfidence) 3. Hubbard Chapter 10 - Probability calibration, decomposing with Monte Carlo 4. Case Study: MVROS cybersecurity Risk Management Plan	• 3.1 Modarres Homework • 3.2 Chi Square Excel • 3.3 SIPmath Prob 2.32 • 3.4 SIPmath Prob 2.33 • 3.5 SIPmath Prob 2.34 • 3.6 Hubbard Discussion 1 • 3.7 Hubbard Discussion 2 • 3.8 MVROS Discussion	45
Week 4 **April 1**	1. Modarres Chapter 3.6 – Start Bayesian Parameter Estimation (Uniform priors only)	• Exam #1 – Midterm	300

Week / Due Date	Reading	Homework	Points
Week 5 **April 8**	1. Modarres Chapter 3.6 – Finish Bayesian Parameter Estimation (Uniform priors only) 2. Modarres Hubbard Chapter 11 - Bayesian estimation 3. Case Study: UAV (Drones) Risk and Safety Assessment Plan 4. Case Study: Challenger and Columbia: Déjà vu (Abkowitz)	• 5.1 Modarres Homework • 5.2 Bayesian Inversion • 5.3 Drones Discussion • 5.4 Challenger Discussion • 5.5 Project Proposal • 5.6 Project Proposal Discussion	45
Week 6 **April 15**	1. Modarres Chapter 8 – Probabilistic Risk Assessment, Compressed Natural Gas Case Study 2. Cox, Tony. What's Wrong with Risk Matrices? 3. Hubbard, Chapter 7 - Risk Matrices and Scales 4. Case Study: Supply Chain Risk Management 5. Case Study: Alaska Pipeline and Denali Quake (Abkowitz)	• 6.1 GNG Excel Intro • 6.2 CNG Simulation • 6.3 Risk Matrices Discussion • 6.4 Supply Chain Discussion • 6.5 ORM Discussion	40
Week 7 **April 22**	1. Pinto and Magpili, Chapter 19 Risk Assessment 2. Hubbard, Chapter 12 - Organizational Issues of Risk Management	• Engineering Management Discussion • Hubbard Discussion • Project	15 100
Week 8 **April 30**	No new material	• Exam #2 – Final Exam	335

Class Procedures:

This course is fully asynchronous, which means there are no set class hours. Nevertheless, it will be a rigorous introduction to the techniques we cover, and you should expect to prepare for and participate in class. We will make extensive use of technology: Blackboard, videos, and email. With your participation, we will create a vibrant, active online learning environment. Class e-mails will be sent to your uark.edu e-mail address, so please check it regularly. Generally speaking, each week of instruction may offer some combination of instructional materials, quizzes, and homework assignments.

Late Submissions / Flexible Schedule / Time Management: If you keep me informed, I am very flexible on turning in assignments. I know many (if not all) of you are busy and sometimes you need a little extra time. With that said, I highly recommend you complete all the Week 1-4 work before the midterm and all the Week 1-8 work before the final exam.

The exams will have a 2 hour time limit, and ProctorU will be used while students take tests. Students must make an appointment with ProctorU prior to taking the test. For exams, it is recommended to use the same computer used for homeworks and quizzes over a wired internet connection. If you reserve your exam slot ahead of time with ProctorU, you can avoid the convenience fees. If you miss an exam

during the scheduled window, please contact the professor as soon as possible to make alternate arrangements.

"ProctorU is a live proctoring service that allows students to take online exams from the comfort of their home. In order to use ProctorU, you will need a high-speed internet connection, a webcam (internal or external), a windows or apple Operating System, and a government issued photo ID. We highly recommend using a dual-band router and a wired internet connection, in order to avoid technical or connection issues during the exam. ProctorU is available 24/7, however, you should [schedule your exam](#) session at least 72 hours in advance. Doing so helps avoid late fees and ensure more exam slots are available.
If you do not already have an account with ProctorU, please visit [go.proctoru.com](#), to create your free student account.

__Student Checklist: What to do Before Every Exam:__
1) *Test Your Equipment:*
   a. *Make sure your computer meets the [minimum requirements](#) and review the [Exam Readiness Guide](#).*
   b. *Visit https://test-it-out.proctoru.com/ prior to every proctoring session to test your equipment. We highly recommend you click on the button that says "connect to a live person" to fully test out your equipment and avoid any exam mishaps.*
   c. *To avoid connection issues, use a wired internet connection. A dual-band router can also help avoid connection issues or interferences and offers more stability. Additionally, be sure to close other programs that might be taking up bandwidth during your exam. You would not want to be streaming Netflix / Hulu, or have several people using the internet at the same time you are taking an exam.*
2) *Check Your Browser:*
   a. *Make sure you are using the current version of either Chrome or Firefox*
   b. *Make sure you have downloaded the ProctorU extension available at http://bit.ly/proctoruchrome or https://www.proctoru.com/firefox.*
3) *Review Test-Taker Resources:*
   a. *Bookmark and review the test-taker resource center [here](#).*
   b. *Watch These Short Videos.*
      i. *For details of what to expect from a proctored exam session, review this video: [Ten Steps for Test-Takers to Get Started With ProctorU (2:35)](#)*
      ii. *For a demonstration of how to launch your exam, review this video: [Live+ Student Walkthrough (2:20)](#)*
4) *Log-On Early:*
   a. *On the day of your exam, you should log on at least 10-15 minutes early to begin the startup process. The startup process with the proctor usually takes about 10-15 minutes, so please log on early to begin this process. Startup time will not affect your exam time"*

Office Hours & Help:
Office hours are available by appointment.   I have weekend, evening, and daytime appointments available and generally try to accommodate your schedule.

Email is by far the best way to contact me – you can click on the "Email" link on the Blackboard menu and send me an email there. If that doesn't work, you can reach me at tptalafu@uark.edu. It's helpful if you can mention which course you're in.   If it's time-critical, please do call or text me on my cellphone at (210) 471-8040 anytime; please bear in mind I'm in the Eastern time zone.

For technical assistance with Blackboard, contact the Blackboard Support at (479) 575-6804. Refer to the Software & Support tab in Blackboard for more support options.

The Student Development Center (479-575-3546) offers various workshops in test taking, time and stress management, as well as study skills. The Writing Center (479-575-6747) offers assistance in essay and report writing as well as grammar and sentence structure (available for students who have courses on campus). You may also contact the Enhanced Learning Center, which now offers online tutoring for some courses (available to students taking courses on campus).

Caveat re: Changes to Syllabus
The above schedule and procedures in this course are subject to change at the discretion of the instructor.

Academic Honesty Policy:

- As a core part of its mission, the University of Arkansas provides students with the opportunity to further their educational goals through programs of study and research in an environment that promotes freedom of inquiry and academic responsibility. Accomplishing this mission is only possible when intellectual honesty and individual integrity prevail. Each University of Arkansas student is required to be familiar with and abide by the University's 'Academic Integrity Policy' at honesty.uark.edu. Students with questions about how these policies apply to a particular course or assignment should immediately contact their instructor.
- Plagiarism is often misunderstood. It can be defined as submitting someone else's work as your own. It is not permissible to "cut and paste" and then just cite another's work. In writing for homework or projects, you should read and learn, process through your mind, relate ideas, and then express what you learned **in your own words**. Cite the references where you found your information. If you do use someone else's words, you must use quotation marks **and** cite. You should not overuse quotes – save them for a rare occurrence.
- A complete statement of the U of A's Academic Honesty Policy is available in the UA Student Handbook and the UA Graduate Catalog.

Inclement Weather Policy:
Weather is unlikely to force cancellation of any online classes or activities. If a known weather event is approaching, it is good practice for students to turn in work early in case of local power outages.

Family Educational Rights and Privacy Act **(FERPA)**
The Family Educational Rights and Privacy Act (FERPA) protects a student's academic and other educational records from unauthorized access. This protection extends to email correspondence between a student and the University of Arkansas faculty and staff.

To provide reasonable assurance that emails are from the student, all university or class related emails must be sent from the student's uark.edu email account. Additionally, university or class related emails must be sent to the student's uark.edu email account.

This means that I cannot acknowledge emails sent from your personal or work email accounts, and I cannot send emails to your personal or work email accounts.

University of Arkansas Academic Policy Series 1520.10

University of Arkansas Academic Policy Series 1520.10 requires that students with disabilities are provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact me privately at the beginning of the semester to make arrangements for necessary classroom adjustments. Please note, you must first verify your eligibility for these through the Center for Educational Access (contact 479–575–3104 or visit http://cea.uark.edu for more information on registration procedures).

Academic Appeals

Academic appeals: Students are first encouraged to resolve academic conflicts and complaints informally with the instructor involved, through their department, or through the assistance of the University Ombuds Office, which can provide objective and confidential mediation. To assist students in identifying the appropriate contact person, please view this List of Program, Department, and College Contacts. A flow chart is also available for viewing. If an informal resolution cannot be reached, there are procedures for students to pursue with complaints of an academic nature. Refer to either the Undergraduate Catalog of Studies or the Graduate Catalog of Studies for appeals structures and formal procedures for academic grievances.

Computer Access Policy

This course is offered as an online course and it is assumed that you have the minimum system requirements to participate (see the START HERE section of the course). It is your responsibility to ensure that you can access all course materials, participate in discussions and upload or download materials and software used for this course. In addition, care has been taken to ensure that the software that is used for this course does not require any out of the ordinary system set-ups. But, if your system does not meet the minimum requirements then it is your responsibility to maintain your system to meet the requirements so that you may participate in this course. Technical difficulties on your part will not excuse you from the timely completion of assignments. If you do experience technical difficulties please make sure that you contact me immediately so that proper assistance might be provided.

Netiquette

Netiquette is a set of rules for behaving properly online. It is important that all participants in online courses be aware of proper online behavior and respect each other.

Use appropriate language for an educational environment:
- Use complete sentences.
- Use proper spelling and grammar.
- Avoid idioms and slang.
- Do not use obscene or threatening language.

Remember that the university values diversity and encourages discourse. Be respectful of differences while engaging in online discussions. For more information about Netiquette, see The Core Rules for Netiquette by Virginia Shea.

CAPS

Academic problems are often related to the non-academic events in your lives. You are welcome to visit with the capable staff at the UA Counseling and Psychological Services (with offices in the North Quadrangle). You can telephone them at 479-575-CAPS. The fact that you telephone is also entirely confidential. Each semester they conduct a variety of support groups dealing with stressful issues.

Equal Treatment for All

The UA "Catalog of Studies" reports that the Campus Council supports equal treatment for all. It "does not condone discriminatory treatment of students or staff on the basis of age, disability, ethnic origin, marital status, race, religious commitment, sex, or sexual orientation in any of the activities conducted on this campus. Members of the faculty are requested to be sensitive to this issue when, for example, presenting lecture material, when assigning seating within the classroom, when selecting groups for laboratory experiments, and when assigning student work. The University faculty, administration, and staff are committed to provide an equal educational opportunity to all students."

Our class work will conform to the principle of equal treatment.

Revised 2/14/2020