



OPRE 6335 / SYSM 6304 – Risk and Decision Analysis

RISK AND DECISION ANALYSIS

Course Information:

Course: SYSM 6304 / OPRE 6335

Term: Fall 2016

Classroom Building: JSOM

Section: 001 / 001

Classroom Number: 2.903

Class Meeting Times: Wednesdays from 4:00pm – 6:45pm

Professor Contact Information:

Professor: Alix Minden, P.E., PMP

Primary Email: Alix.Minden@UTDallas.edu

Secondary Email: Alix.Minden@LCMI.com

Office Phone: (972) 883-3894

Office Location: ECSS 3.209

Office Hours: Tuesdays, Wednesdays, and Fridays 1:00pm – 3:30pm
After class and by appointment, as needed.

(General) Course Pre-requisites and Other Restrictions:

Prerequisite: SYSM 6303 / OPRE 6301 – Quantitative Introduction to Risk and Uncertainty in Business.

Other Restrictions: In order to be successful in this course, you SHALL / MUST have an INTERMEDIATE understanding of Excel, at a MINIMUM.

Course Description:

SYSM 6304 (OPRE 6335) Risk and Decision Analysis (3 credit hours) This course provides an overview of the main concepts and methods of risk assessment, risk management, and decision analysis. The methods used in industry, such as probabilistic risk assessment, six sigma, and reliability, are discussed. Advanced methods from economics and finance (decision optimization and portfolio analysis) are presented.

Course Structure:

The course's "face time" will be conducted as a mix of traditional lectures, group and seminar-style discussions, in-class exercises, and project presentations. There will be weekly assigned readings and / or webinars required to review. The content will be assigned from two required textbooks, the INCOSE Systems Engineering Handbook, INCOSE's website, and potentially other case studies. Deliverables will include various



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homework assignments, quizzes (mini-exams), and a term group project. As appropriate, guest presenters may be invited to present their unique perspectives.

Learning Objectives:

Upon successful completion of this course, students will:

- Understand what System Risk Management is, its established concepts and best practices, and why it is vital.
- Understand how to analyze risks using various industry-standard techniques based on probabilistic, statistical and / or decision-making methodologies.
- Be capable of performing a thorough system risk analysis study.
- Understand decision impacts when risks are not properly assessed and managed.
- Understand the importance of establishing fundamental ground rules, guidelines, and communication plans for effectively conducting Risk Management.
- Understand when to use each of these tools, techniques, and processes to enable the implementation of an effective Risk Management Plan.

Required Textbooks and Materials:

1. Haimes, Yacov Y. *Risk Modeling, Assessment, and Management*. Hoboken: John Wiley & Sons, Inc., 2015. (ISBN: 9781119017981)
2. Hermann, Jeffrey W. *Engineering Decision Making and Risk Management*. Hoboken: John Wiley & Sons, Inc., 2015. (ISBN: 9781118919330)
3. Walden, David D., Garry J. Roedler, Kevin J. Forsberg, R. Douglas Hamelin, and Thomas M. Shortell. *International Council on Systems Engineering (INCOSE) Systems Engineering Handbook*. Version 4, July 2015. (ISBN: 9781118999400)
4. **NOTE:** Textbook #1 and Textbook #2 will be available for **free** in electronic form for UT-Dallas students, via the UTD McDermott electronic Library.
5. **NOTE:** The electronic version of “textbook” #3 is available to students for **free**, as INCOSE “CAB” Members, via INCOSE’s website.
6. Others to be identified later, and posted to eLearning (Blackboard).



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Required Software (SOFTWARE IS REQUIRED TO PURCHASE!):

1. Palisade's The DecisionTools Suite 7.5 Industrial
 - a. The STUDENT VERSION is available for **\$50 (1-yr license)**
 - b. http://www.palisade.com/cart/products_EN.asp?cat=51&panel=0
 - c. NOTE: The UTD Bookstore will not stock the software unless specifically requested to do so (e.g. for GI Bill program, or similar.)
2. Microsoft Office (**available free as a UTD student**)
3. Microsoft Visio & Project (**available free via DreamSpark Premium**)
4. **NOTE:** Your premium "Dreamspark" account will not be available until census day for the semester.

Great Reference Materials:

1. To be identified later and posted to eLearning (Blackboard).

Topics the Course Will Cover:

- Detailed Overview of Systems Risk Management (RM), RM Steps, and Categories of Risk.
- Importance of planning, creating, and using a Risk Management Plan (RMP).
- Pareto and Root Cause Analysis
- Multi-Objective Trade-Off Analysis
- Fault Trees and other specific risk analysis techniques.
- Overview of Decision-Making Techniques, their relationship to Risk Management
- Details and Application Examples of Various Relevant Decision-Making Techniques and processes.
- Waterfall Planning, Contingency Planning, and "Fallback" Plans
- Theory Vs. Reality of Risk Management
- "Expected Value" & the importance of accurate, relevant, and timely information



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Grading Policy:

Item	Total Weight
"Homework" - Weekly Reflective Assignments	5.0%
"Homework" - Knowledge Application Assignments (4 to 6)	25.0%
Class Participation	10.0%
Term Group Project	35.0%
Quizzes (~5 to 10)	25.0%
Total:	100%

NOTE: Assignment due dates will be identified within eLearning (Blackboard), but typically by 7pm CT two days before the next class. The quizzes will be **random** throughout the semester. The term group project due dates will be identified during class and also in eLearning.

NOTE: Course quizzes (mini-exams) are NOT available for "make-up". However, your **(one)** lowest score will be "dropped," with the possibility of a second **(two)** depending on the total number of quizzes for the semester (~ >7).

NOTE: All assignments, including the quizzes shall be submitted via **eLearning**, *unless otherwise specified by the professor*. Email and / or hardcopy submission will not be accepted (unless otherwise approved by professor.)

Instructor & Other Course Policies:

- Students are expected to attend all classes and participate. Student participation contributes to the overall learning experience.
- Late delivery of assignments will not be accepted unless receiving *prior* professor approval.
- Unless specifically discussed during class, no extra credit is planned or available.
- All written communication will be via eLearning, and sometimes via email, but only using your UTD email account. You may initiate email communication via a non-UTD email account (although discouraged), but email communication initiated by professor will never be to a non-UTD address.
- Professor reserves the right to modify syllabus, as needed. If changed, notification will be provided to students via eLearning syllabus link, eLearning Announcements, and during the class period (if changed during, otherwise the following).



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UT Dallas' Policy on Sharing Confidential Information:

Per UTD Administration direction, the following policy is explicitly included in the syllabus.

“Students considering sharing personal information in email, in person, or within assignments or exams should be aware that faculty members and teaching/research assistants are required by UT Dallas policy to report information about sexual misconduct to the UT Dallas Title IX Coordinator. Per university policy, faculty have been informed that they must identify the student to the UT Dallas Title IX Coordinator. Students who wish to have confidential discussions of incidents related to sexual harassment or sexual misconduct should contact the Student Counseling Center (972-883-2527 or after hours 972-UTD-TALK or 972-883-8255), the Women's Center (972-883-8255), a health care provider in the Student Health Center (972-883-2747), the clergyperson (or other legally recognized religious advisor) of their choice, or an off-campus resource (i.e., rape crisis center, doctor, psychologist). Students who are sexually assaulted, harassed, or victims of sexual misconduct, domestic violence, or stalking, are encouraged to directly report these incidents to the UT Dallas Police Department at 972-883-2222 or to the Title IX Coordinator at 972-883-2218. Additional information and resources may be found at <http://www.utdallas.edu/oiec/title-ix/resources>.”

[Additional] UT Dallas Syllabus Policies and Procedures:

The information contained in the following link constitutes the University's additional policies and procedures segment of the course syllabus.

Please go to <http://provost.utdallas.edu/syllabus-policies/> for these policies.



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Planned Weekly Topic(s) and Relevant Textbook Chapter(s):

Week	Date	Lec #	Major Focus Area	Lecture Topic	Y. Haimes Chapter(s)	J. Herrmann Chapter(s)	INCOSE SE HB	Other Articles from eLibrary	INCOSE Webinar
1	8/24	1	#0 - Overview of course content and its connections	<i>Intro of Students</i>					
1	8/24	2		<i>Course Overview</i>					
1	8/24	3		<i>Course Purpose & How all Topics Tie Together (plus project)</i>					
2	8/31	4	#1 – Detailed Overview of Systems Risk Management (RM), RM Steps, and Risk Categories	<i>Detailed Overview of Systems Risk Management (RM), RM Steps, and Categories of Risk</i>	1 (just skim over it to understand how the book is organized) 2.1 - 2.2.1.1, 2.6 - 2.8	Preface (just skim over it to understand how the book is organized), 9.1 - 9.2	5.4		
3	9/7	5	#2 – Importance of Planning & Creating (How to) a Risk Management Plan (RMP)	<i>Importance of Planning to Create and Use an RMP</i>	12				
3	9/7	6		<i>How to Create an RMP</i>	15				
4	9/14	7	#3 – Techniques & Tools and Use of Data to create an RMP	<i>Overview of how to implement a Risk Management Plan (RMP)</i>	7				



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Week	Date	Lec #	Major Focus Area	Lecture Topic	Y. Haimes Chapter(s)	J. Herrmann Chapter(s)	INCOSE SE HB	Other Articles from eLibrary	INCOSE Webinar
5	9/21	8		<i>Overview of Analysis Techniques, their relationship to Risk Assessment</i>			4.6.2.2		
5	9/21	9		<i>Overview of Pareto and Root Cause Analysis</i>					Webinar 73 – Radical Risk Identification, Moving Risk Management into the 21st Century (Wiggins, Laurie) (18 March 2015) https://connect.incose.org/Library/Webinars/Documents/Webinar%20Archives/Webinar%2073%20Radical%20Risk%20Identification_Moving%20Risk%20Management%20into%20the%2021st%20Century.mp4
6	9/28	10		<i>Fault Trees and Other Related Analysis Techniques</i>	13				
7	10/5	11		<i>Multi-Objective Trade-Off Analysis</i>	5				
8	10/12	12		<i>Overview of Decision-Making Techniques, their relationship to Risk Management</i>		1, 2	5.3		
8	10/12			GP-P3 Presentations					



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Week	Date	Lec #	Major Focus Area	Lecture Topic	Y. Haimes Chapter(s)	J. Herrmann Chapter(s)	INCOSE SE HB	Other Articles from eLibrary	INCOSE Webinar
9	10/19	13		<i>Details and Application Examples of Various Relevant Decision-Making Techniques</i>		3, 5			
10	10/26	14		<i>Decision-Making Processes within Risk Management</i>		7			
11	11/2	15	#4 – RMP Implementation – Communication and Mitigation	<i>The importance of Regular Communication During Risk Management Efforts</i>		9.7 - 9.8.9, 10.3 - 10.8			
11	11/2	16		<i>The Risk Mitigation Process - Waterfall Planning, Contingency Planning, and "Fallback" Plans</i>		9.5 - 9.6	3.4 - 3.4.1	Khamooshi, Homayoun ; Cioffi, Denis F.; http://utdallas.primo.hosted.exlibrisgroup.com/UTDALMA:EVERYTHING:TN_ieee10.1109/TEM.2008.927818	
12	11/9	17	#5 – Systems RM – "Real Life" Issues (a.k.a. Theory Vs. Reality)	<i>Overview of Theory Vs. Reality of Risk Management</i>	16.1 - 16.3, 16.6.3	9.9 - 9.10			



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Week	Date	Lec #	Major Focus Area	Lecture Topic	Y. Haimes Chapter(s)	J. Herrmann Chapter(s)	INCOSE SE HB	Other Articles from eLibrary	INCOSE Webinar	
13	11/16	18		<i>"Expected Value" & The Importance of Accurate, Relevant, and Timely Information</i>		8				
break	11/23									
14	11/30			<i>GP-P4 Presentations</i>						
14	11/30	19		<i>Risk Management "Things to Watch Out For"</i>	6.3 - 6.5.5.4	11.7		Chapter 5, http://utdallas.primo.hosted.exlibrisgroup.com/UTDALMA:EVERYTHING:UTD_ALMA51163082150001421		
15	12/7	20	#6 – TIATA & Course Wrap-Up	<i>TIATA</i>						
15	12/7	21		<i>Course Wrap-Up</i>						