Course Syllabus: PPD 587 (ISE 587)
Risk Analysis (4 Units)

Catalogue Description
Concepts of risk analysis, risks in engineered systems, environmental risks, security risks; methods of risk analysis, fault trees and event trees; quantification of probabilities, use of data, models, and expert judgments; risks and decisions, multiattribute utility, interlinking risk analysis with risk management; life and death decisions, building utility functions for health and consumption, and applications to homeland security decisions.

Recommended preparation: MATH 108 or MATH 116

Instructor – Ali Abbas

Office: 310R Ollin Hall of Engineering
Office Hours: TBA
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Teaching Assistant – TBA

Class Time and Location

Class Time: Tuesdays 6 to 9:20 PM
Class Location : VPD 116

Readings

All assigned readings will be posted on Blackboard in pdf format.

Text

Abbas, A. E. 2018. Foundations of Multiattribute Utility, Cambridge University Press.

Optional Text:

Howard, R. A and Abbas, A. E. 2015. Foundations of Decision Analysis, Pearson, NY.

Students may find either or both of the texts above useful as additional reference material.

Overview

This class is an introduction to risk analysis in several fields and its connections with decision making, including engineering risk analysis, life and death risk analysis, and security risk analysis. Examples will come from health care, product safety, national security, and other areas of public policy. Students will be introduced the concepts and

methods of decision and risk analysis. Students will also learn how to apply risk analysis in real world settings.

Objectives

- Understand the basic concepts of risk analysis and the relationship between probability theory and modeling, risk analysis, and decision analysis
- Understand how to interpret probability and probabilistic modeling, in the evaluation of risk
- Learn how to understand and interpret the basic tools of risk analysis – fault trees, event trees, and simulation models
- Understand the issues surrounding the use of risk analysis in decision making
- Understanding the foundations of decision theory and its evolution to date
- Understanding of the rationality principles of decision making
- Ability to develop prescriptive models of choices under uncertainty
- Understanding issues with flawed methods of decision and risk analysis

Class Format

The class will be primarily in lecture format with Socratic dialogue. In addition, students will conduct a simple risk analysis project of their own choice and present progress reports throughout the class. Assigned readings will serve as preparation for lectures, and assigned problem sets will reinforce lecture material. There will be a Final project.

Tests and Grades

Grades will be assigned on the basis of homework assignments (25%), the quality of the group assignments (25%), participation (10%), and the final project (40%).

Disability Services and Programs Statement

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to the TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m. – 5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Academic Integrity Standards

Students are required to review USC's academic integrity standards in the SCAMPUS (www.usc.edu/department/publications/SCAMPUS/gov. Violations of any of the academic integrity standards set by the University can have serious consequences.

Syllabus and Syllabus Updates (Tentative)

Updates may be made to the syllabus over the course of the semester. The most up-to-date version is always posted to the "Syllabus" section of Blackboard.

Date	#	Topics and Presentation Schedule	Assignments
Jan- 19	1	Introductions; overview of the class; concepts of decision and risk analysis; Bayes, Bernoulli, Laplace	Individual and Group Assignments and Readings .
Jan-26	2	Decision Demonstration	Individual and Group Assignments and Readings
Feb-02	3	Structuring risk problems, event trees, fault trees, influence diagrams, decision trees	Individual and Group Assignments and Readings
Feb-09	4	The Rules of Rational Choice	Individual and Group Assignments and Readings
Feb-16	5	Review of probability; eliciting probabilities from experts,	Individual and Group Assignments and Readings
Feb-23	6	Analyzing a Decision, Value of information	Individual and Group Assignments and Readings
Mar-02	7	Multiattribute Utility Functions	Individual and Group Assignments and Readings
Mar-09	8	More on Multiattribute Utility Functions	Individual and Group Assignments and Readings
Mar-16	9	Sensitivity analysis, introduction to Monte Carlo simulation	Individual and Group Assignments and Readings
Mar-23	10	Wellness Day (No Class)	
Mar-30	11	More on Monte Carlo simulation	Individual and Group

			Assignments and Readings
Apr-06	12	Application areas: Life and Death Decisions	Individual and Group Assignments and Readings
Apr-13	13	Application areas: TSA Decisions	Individual and Group Assignments and Readings
Apr-20	14	Flawed Methods of Decision and Risk Analysis	Individual and Group Assignments and Readings
Apr-27	15	Risk communication, risk management, cognitive biases	Individual and Group Assignments and Readings
		Final Report Due	