

ENGM4675/6675 Risk Assessment and Management
Course Outline – Winter 2021
(All times in this document are Atlantic time)

INSTRUCTORS

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MEETING TIMES

Lectures: Thu 11:30-12:30 on MS Teams

Tutorial: Thu 12:30-14:30 on MS Teams

AIM OF THE COURSE

To become acquainted with: the fundamentals of integrated risk assessment and risk-based decision analysis; stochastic modeling of natural and man-made hazards; evaluation of failure chances and consequences; decision criteria and acceptable risk; methods of risk assessment and management based on event trees, decision trees, fault trees, system reliability, and stochastic processes in space and time. To gain practical experience through a variety of case studies.

TEXTBOOK

Risk Assessment and Management, course notes, 330 pgs, by G.A. Fenton, for \$30 each.

COURSE REQUIREMENTS

1. There will be 6 assignments, due no later than 8:00 pm Atlantic time on the dates indicated below, unless otherwise arranged with the class. Late assignments will not be accepted unless arranged ahead of time with the instructor. Assignments are to be submitted electronically on Brightspace.
2. A term project involving the application of risk assessment methodologies to a topic of engineering interest.
3. A 24-hour midterm exam.
4. A 24-hour final exam.

There will be no supplementary exam in this course.

GRADING FORMULA

10% assignments + 20% project + 30% midterm + 40% final exam

WEB RESOURCES

See Brightspace for updates, help and summary pages, assignments and assignment solutions.

SCHEDULE OF EVENTS

1. MIDTERM: Thursday, Mar 04, 2021, 10:00 AM, 24-hour duration
2. PROJECT PROPOSAL: due Tuesday, Mar 09, 2021, 8:00 PM
3. FINAL EXAM: Thursday, Apr 08, 2021, 10:00 AM, 24-hour duration
4. FINAL PROJECT: due Friday, Apr 16, 2021, 8:00 PM
5. ASSIGNMENTS (All due at 8:00 PM on dates indicated):

Assn #1: Due Mon Feb 1

Assn #2: Due Mon Feb 8

Assn #3: Due Mon Feb 22

Assn #4: Due Mon Mar 8

Assn #5: Due Mon Mar 22

Assn #6: Due Mon Apr 5

DETAILED COURSE SCHEDULE

Week 00:

L1: Course outline, Overview of risk assessment and management: examples of risk assessment in practice, definition of reliability and risk, acceptable risk. (Chap 1)

Week 01:

L1: Review of basic probability theory (Chap 2)

L2: Random variables, probability distributions, main descriptors (Sections 3.1-3.3)

Week 02:

L1: Covariance, correlation, linear combinations (Sections 3.4-3.5)

Common discrete distributions (Binomial family) (Section 3.6)

L2: Poisson family and common continuous distributions (Sections 3.6.5 and 3.7)

Week 03:

L1: Extreme value distributions (Section 3.8)

L2: Reliability Engineering (Sections 4.1-4.3)

Week 04:

L1: Fault Trees and R-L Reliability (Sections 4.4-4.8)

L2: Decision analysis, decision trees (Chap 5)

Week 05:

L1: Decision analysis example (Chap 5)

Functions of single random variables (Section 6.1)

L2: Functions of two random variables, approximate moments of functions (Sections 6.2-6.4)

Week 06:

L1: Stochastic processes, Discrete-Time Discrete-State Markov Chains (Sections 7.1-7.2)

L2: Discrete-Time Discrete-State Markov Chains Cont'd (Section 7.2)

Week 07:

L1: Continuous-Time Discrete-State Markov Chains (Section 7.3)

L2: midterm

Week 08:

L1: Birth & Death and Queueing Markov Chains (Section 7.3.1 + 7.4)

L2: Continuous-Time Continuous-State Random Fields (Section 7.5)

Week 09:

L1: Continuous-Time Continuous-State Random Fields Cont'd (Section 7.5)

L2: Best Linear Unbiased Estimation (Chap 8)

Week 10:

L1: Best Linear Unbiased Estimation Cont'd (Chap 8)

L2: Basics of Simulation (Chap 10)

Week 11:

L1: Review

L2: Review