UNIVERSITY OF MARYLAND

College Park Campus

Department of Civil and Environmental Engineering

ENCE 620 - Risk Analysis in Engineering (3)

INSTRUCTOR Name Professor Bilal M. Ayyub
Office Hours 12-1:00 pm & appointment, Room 0305, Eng. Classroom Bldg.
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TEXTBOOKS

Risk Analysis in Engineering and Economics, B. M. Ayyub, Draft manuscript, 2002.

Probability, Statistics, and Reliability for Engineers and Scientists, B. M. Ayyub and R. H. McCuen, CRC Press, FL, 2003.

REFERENCE

Probabilistic Risk Assessment and Management for Engineers and Scientists, by H. Kumamoto and E. J. Henley, Second Edition, IEEE Press, NY, 1996.

GRADING

Homework and project: 50%, and Exams:50%

COURSE OUTLINE

Chapter 1. Introduction: Knowledge and Ignorance, Information Uncertainty in Engineering Systems

Chapter 2. Risk Methods: Risk Terminology, Risk Assessment, Risk Management and Control, Risk Acceptance, Risk Communication

Chapter 3. System Definition and Structure: System Definition Models, Hierarchical Definitions of Systems, System Complexity

Chapter 4. Reliability Assessment: Analytical Reliability Assessment, Empirical Reliability Analysis Using Life Data, Reliability Analysis of Systems

Chapter 5. Consequence Assessment: Types, Cause-Consequence Diagrams, Microeconomic Modeling, Value of Human Life, Flood Damages, Consequence Propagation

Chapter 6. Engineering Economics: Time Value of Money, Interest Models, Equivalence

Chapter 7. Decision Analysis: Risk Aversion, Risk Homeostasis, Influence Diagrams and Decision Trees, Discounting Procedures, Decision Criteria, Tradeoff Analysis, Repair and Maintenance Issues, Maintainability Analysis, Repair Analysis, Warranty Analysis, Insurance Models

Chapter 8. Data Needs for Risk Studies: Elicitation Methods of Expert Opinions, Guidance

Appendix A. Basic Probability and Reliability Mathematics: Set Theory, Boolean Algebra, Mathematics of Probability, Random Variables, Selected Probability Distributions, Joint Random Variables, Statistics

HOMEWORK ASSIGNMENTS

Professional presentation of homework assignments is required. Professional presentation consists of neat and organized solution of problems on one side of 8.5"x11" papers. The homework assignments are due one week after they are assigned.

PROJECT

Teams of two or three are required to work on a risk technology or risk issue by developing the following items as applicable: Title Page, Executive Summary, Table of Contents, Objectives and scope, Historical development, Methodology summary, Applications, Conclusions, References and Appendices. Professional presentation of the project report is required that should consist of neat and organized solutions on one side of 8.5"x11" papers. Computer-generated plots and printouts are required for all sample, and summary calculations. Also, teams are required to setup a web page with all project details and report, and related links. The project is due on the last day of classes.