



Course Schedule 'Introduction to Quantitative Risk Analysis'

Day 1

Introduction to risk analysis

- Background of risk analysis and risk management
- Risk analysis as a team effort
- Going from data to knowledge to a useful decision tool
 - Dealing with the limits of current knowledge

Introduction to statistical descriptors

- Mean, mode, standard deviation, skewness, kurtosis, percentiles

Introduction to probability theory

- The use of distributions: uncertainty, variability and inter-individual variability
- Probability concepts
- Graphical representations of risk events: Venn diagrams, fault trees and event trees
- A look at some simple probability distributions

Introduction to risk modeling

- Monte Carlo simulation, Crystal Ball/@RISK and Excel
 - Brief tutorial on Crystal Ball/@RISK
- Calculation vs. simulation – the pros and cons of Monte Carlo
- Typical risk analysis results, their presentation and interpretation
- Practical problems to solve

Day 2

- Some stochastic processes – the basis of risk analysis
 - Binomial Process
 - Binomial, beta, negative binomial and geometric distributions
 - Imperfect tests, machine failures, risk events, etc.;
 - Poisson Process
 - Poisson, gamma, and exponential distributions
 - Modelling insurance claims, accidents, random outbreaks, etc.
 - Hypergeometric process
 - Hypergeometric and inverse Hypergeometric distributions
 - Survey results, prevalence estimate with imperfect diagnostic test, gambling etc.

Day 3

- Modelling example for correlated variables
 - Time-series correlation to determine optimal testing strategy
- Introduction to analyzing and using data for risk analysis:
 - Statistical techniques
 - Why we need uncertainty distributions not confidence intervals in risk analysis
 - Creating uncertainty distributions with standard tests
 - t-tests, z-tests, Chi-squared tests
 - Examples of estimation of population mean and standard deviation
- Bayesian networks, risk attribution
 - Incorporating uncertainty
- Example risk analyses (a range of examples will also be covered during the course).
- Wrap up and review of course material