

# CHEN/SENG 460/660—QUANTITATIVE RISK ANALYSIS

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**Textbooks:** Norman Fenton and Martin Neil, *Risk Assessment and Decision Analysis with Bayesian Networks*, CRC Press, 2012  
and  
Charles E. Ebeling, *An Introduction to Reliability and Maintainability Engineering*, 2nd Edition, Waveland Press, Inc., 2010

**Description:** This course provides the opportunity to learn about risk, the applications of risk involved with industrial activities, and how to practice risk-informed decision-making and risk management. Because engineering is a decision-making enterprise, a decision-making way of thinking is used throughout the course.

Risk analysis consists of identifying, characterizing, reducing, managing, and informing others about the nature, magnitude, probability, and uncertainty of possible events. Therefore, an understanding of methods and tools to represent and quantify uncertain events is essential. These tools include the models and methods of probability to quantify uncertain events and statistics to evaluate data and calculate model parameters for up-to-date system reliability estimates. Quantification of risk and estimation or prevision of potential failure occurrences is essential for all risk analysis applications.

Quantitative risk assessment and good decision-making based on risk assessment is increasingly needed for design, manufacturing, operation, management, and regulations. The risk analysis approach facilitates evaluation of calculations and results so that the benefits and costs of each decision alternative can be weighed and balanced. Open discussion and analysis of decision can help to improve the organization safety culture based on good risk management and also to increase public confidence in plant leadership.

## Topics:

- Hazards, risk, risk analysis, probability, reliability
- Quantitative Risk Assessment methods
- Performance assessment
- Uncertainty analysis
- Consequence analysis
- Risk contributors
- Risk values, risk acceptance criteria
- Risk management
- Risk communication and safety culture

## Objectives:

Learn how to perform risk assessment, reduce risk within acceptable levels, manage risk, and improve system risk and reliability, make risk/gain—informed decisions to benefit the organization and the community, and communicate decisions that affect the public, which benefits from and supports the products of your company.

4.2 CEUs	42 PDHs
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