

NPRE 598: Probabilistic Risk Analysis

Credit: 4 graduate hours.

Meeting Schedule/Contact Hours: Tu. and Th. 2:00 -3:50pm

Prerequisite: Recommended: STAT 400 or equivalent probability/statistics

Instructor:

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Introduction:

It offers a comprehensive and in-depth review of advanced methods for Probabilistic Risk Analysis (PRA). Topics include: Fundamental theories of risk modeling, Risk scenario development, Model uncertainty, Parameter uncertainty, Uncertainty propagation (e.g., Method of Moment, Monte Carlo), Bayesian updating, Data analysis, Hardware reliability, Human error modeling, Risk importance ranking, Precursor analysis, Expert elicitation and aggregation, and Next generation PRA methods and tools. Risk analysis software will be used for homework and class projects. While the examples will primarily focus on the nuclear power domain, the course will also cover current advancements in risk analysis of other complex systems (e.g., space, aviation, oil and gas).

Grading:

- Homework - 25%
- Midterm Exam (open books and open notes) - 25%
- Final Exam (cumulative, open books and notes) - 30%
- Term Project – 20%

Reading Materials

- A set of notes, slides, reports, and articles
- Modarres, M., 2006, *Risk Analysis in Engineering: Techniques, Tools, and Trends*, Taylor & Francis
- Bedford, T., Cooke, R., 2001, *Probabilistic Risk Analysis: Foundations and Methods*, Cambridge University Press
- Lee, J., McCormick, N. 2011, *Risk and Safety Analysis of Nuclear Systems*, John Wiley & Sons