

Workshop on Bayesian Inference for PRA

This four-hour (in two parts) workshop covers the application of Bayesian inference methods in Probabilistic Risk Assessment (PRA). The objective is for participants to be able to describe inference processes as part of PRA applications and to perform calculations related to the topic. We will describe how to update Bayesian priors and apply tools including Excel and OpenBUGS using the techniques described in the Springer book *Bayesian Inference for Probabilistic Risk Assessment* (coauthored by the lecturer, Dr. Curtis Smith).

In the workshop, we will address a variety of issues related to using probabilistic models for estimating PRA parameters. We will provide background to the analysis framework using a simple fault tree/event tree risk assessment model, then proceed to demonstrate the analysis of varying-complexity problems from traditional conjugate-types of inference through applications including uncertain data and trending. Specific topics of discussion are:

- Introduction to Bayes and Bayesian Networks
- Introduction to OpenBUGS
- Conjugate calculations using OpenBUGS
- Priors including Non-informative Priors
- Non-conjugate Calculations using OpenBUGS
- Modeling Duration Events such as Off-site Power Recovery
- Bayesian Trending
- Bayesian Regression Models for Fragility Analysis
- Uncertain Data
- Extreme Value Analysis

When? April 12th and 13th, from 8am to 10am MDT

Who? Dr. Curtis Smith

Curtis Smith, Ph.D., is the Director for the Idaho National Laboratory's Nuclear Safety and Regulatory Research Division. Dr. Smith has been in the risk and reliability assessment field for more than 30 years. He has worked at INL as a risk analysis specialist and has served as a consultant for a diverse set of organizations including the Department of Energy (DOE), the Nuclear Regulatory Commission (NRC), the National Aeronautics and Space Administration (NASA), the International Atomic Energy Agency (IAEA), the Federal Aviation Administration (FAA), and other government and private companies. Dr. Smith has published over 275 papers, books, and reports on risk and reliability theory and application. He holds a Ph.D. in nuclear engineering from Massachusetts Institute of Technology. Contact: Curtis.Smith@inl.gov

