ETH
Eidgenössische Technische Hochschule Zürich
Ecole polytechnique fédérale de Zurich
Politecnico federale di Zurigo

Risk & Safety
Prof. Dr. Michael H. Faber

Lectures on:

PROBABILITY-BASED ENGINEERING ANALYSIS AND DESIGN

Prof. PhD. Steve Winterstein, Stanford University

Date: May 18, 2010, 11:00 – 14:00; May 19-21, 2010, 14:00-17:00
Place: Room HPT C 103, ETH Hönggerberg Zurich

This series of seminars will survey the topics of probability and stochastic processes, and their application to various problems of engineering analysis and design. Emphasis will be placed on methods that are in common use in industry applications of reliability theory.

Topics discussed will include:

- basic probability models
- random process models, particularly those that describe random vibration of mechanical systems
- statistical inference, to calibrate these models to the data at hand
- structural reliability analysis methods, such as FORM/SORM, to propagate the uncertainty in these models
- probability-based design methods such as LRFD (Load and Resistance Factor Design)

Examples will be drawn from a wide range of engineering applications. Particular attention will be paid to complex structural loading mechanisms - such as wind, wave, seismic, and ice loads - whose uncertainties have especially motivated the use of probabilistic methods. Limit states arising from both extreme loading and cumulative damage will be considered. The basis behind some current probability-based structural codes will be discussed.

Throughout these topics, the talks will seek to provide a general overview, appropriate for those with little or no background in probability or statistics. Additional material and references will of course be made available to those seeking greater technical detail.