CE 724: Probabilistic Methods in Structural Engineering
Fall 2007

INSTRUCTOR: Dr. Abhinav Gupta, 413 Mann Hall, Phone: 515-1385; email: agupta1@ncsu.edu
CLASS TIMING: T, H: 11:45 am – 1:00 pm, 404 Mann Hall
OFFICE HOURS: Walk-in or contact by email

General: This course is suitable for students in all areas of civil and mechanical engineering.

Course description: This course is intended to provide an understanding of probability and statistics in civil/ mechanical engineering applications. It will focus on common probabilistic models, statistical analysis of observed data, reliability based design and decision making, and modeling of uncertainties that are unavoidable in the design and planning of engineering systems. The major topics include:
(1) Fundamentals of probability theory
(2) Common probabilistic models
(3) Statistical analysis of recorded data
(4) Fundamentals of reliability analysis (First and second order reliability methods)
(5) Monte Carlo simulation
(6) Development of reliability based design codes
(7) Evaluation of target reliability levels (code calibration)
(8) System reliability and risk-based decision making

Student Learning Objectives: Upon successful completion of this course, students will be able to identify and evaluate engineering problems by answering the following set of questions: What can go wrong? What is the likelihood that it would go wrong? And, what are the consequences? Students will be able to:
(1) Identify the data types
(2) Analyze, test, verify and critique the probabilistic models associated with data types
(3) Model and analyze the uncertainties in engineering systems
(4) Estimate consequences of certain events
(5) Evaluate system reliability
(6) Apply concepts and develop computational models for development of reliability-based design codes.

COMPUTING: Excel Spreadsheet will be used for numerical solutions.

Grading:
Homework – 50% Term Paper – 15% Mid-term – 15% Final – 20%

HOMEWORK: Assigned each week and collected the following week. Homework should be submitted in a professional format.

EXAMS: The exams will be either take home tests OR in-class open book and open notes.

ATTENDANCE: University’s attendance policy can be viewed at
http://www.ncsu.edu/policies/academic_affairs/courses_undergrad/REG02.20.3.php

ACADEMIC INTEGRITY: Students are expected to adhere to the guidelines for academic integrity as outlined in the NC State University Code of Student Conduct (http://www.ncsu.edu/policies/student_services/student_discipline/POL11.35.1.php)

STUDENTS WITH DISABILITY: Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State's policy on working with students with disabilities, please see http://www.ncsu.edu/policies/academic_affairs/courses_undergrad/REG02.20.1.php
Suggested Texts:


*Probability, Statistics and Decision for Civil Engineers,* J.R. Benjamin and C. A. Cornell, McGraw Hill, 1970