

ELECTRIC POWER SYSTEM RELIABILITY EVALUATION
A SHORT COURSE PRESENTED AT IIT KHARAGPUR
JANUARY 9–12, 2006

Course outline:

Summary: This course consisted of 16 hours of instruction, and was worth one semester credit hour. It provided an introduction to the basic concepts of reliability and their application to electric power systems. Instructional material for the course was provided by the instructors.

Part 1 (6 hours): General reliability modeling and evaluation: introduction to probability and stochastic processes; frequency balancing approach; system modeling for reliability; methods of reliability assessment: state space, cut-set and tie-set analysis, decomposition; Monte Carlo simulation: non-sequential and sequential; synchronous and asynchronous timing.

Part 2 (10 hours): Reliability modeling and analysis of electric power systems: bulk power systems, distribution systems, and industrial systems. Component modeling: generator modeling, transmission line modeling, load modeling; capacity outage table; probability and frequency distributions; unit addition algorithm; load modeling algorithm. Generation adequacy assessment using discrete convolution: discrete convolution of generation and load models; generation reserve model; determination of LOLP, LOLF, EUE. Interconnected System Reliability: methods for multi-area and composite system analysis; contingency enumeration/ranking; equivalent assistance; stochastic/probabilistic load flow; state space decomposition; Monte Carlo Simulation, sequential and non-sequential. Overview of distribution system reliability analysis. Overview of industrial and commercial system reliability analysis.

Instructor Profiles:

Chanan Singh is currently Regents Professor, J. W. Runyon Professor and Department Head of Electrical Engineering at Texas A&M University, College Station. He served as Director of the NSF Power System Program from 1995 to 1996. His research and consulting have been focused on power system reliability. He is author/coauthor of two books, several book chapters and numerous publications. He is a Fellow of IEEE and recipient of the IEEE 1998 Outstanding Power Engineering Educator Award. In 1997, the University of Saskatchewan awarded him a D.Sc. for his contributions to research and education in power system reliability.

Joydeep Mitra is currently Associate Professor of Electrical Engineering and Affiliate Faculty with the Institute of Public Utilities at Michigan State University, East Lansing. Dr. Mitra has five years of industrial experience in Engineering and Consulting, and nine years of academic experience as faculty at North Dakota State University, New Mexico State University and Michigan State University. He is editor/co-author of two books, and several book chapters and technical articles. He is a Senior Member of the IEEE, and recipient of an NSF Career Award. His research interests include power system reliability, distributed energy resources, and power system planning.