MANIPAL UNIVERSITY JAIPUR

# International Summer School Manipal University Jaipur [ISSMUJ]-2022

**[Hybrid Mode]**

## Course Overview

Name of Course/Project: **Introduction of Software Reliability**
Name of instructor: **Dr. Bhoopendra Pachauri**
Session: June-July 2022
Language of instruction: English
Number of contact hours: 36
Credit awarded: 03

**Objective of Course**

Learn about the requirement of software reliability Basic idea about the reliability theory

Learn basics of parameter estimation Basic idea about the software life cycle

Understand the development of software reliability modeling

**Syllabus**

**Introduction;** The Need for System Software Reliability, Software-related Problems, Software Reliability Engineering, Future Problems in the Twenty-first Century.

**Reliability Concept;** Reliability Measures, Common Distribution Functions, A Generalized Systemability Function, System Reliability with Multiple Failure Modes, Markov Processes, Counting Processes.

**Parameter Estimation;** Point Estimation (MLE and LSE), Using Soft-computing, Non-linear Regression.

**Software Development Lifecycle and Data Analysis;** Software vs Hardware Reliability. Software Reliability and Testing Concepts, Software Lifecycle, Software Development Process and its Applications, Software Verification and Validation, Data Analysis, Failure Data Sets.

**Software Reliability Modelling;** Discussion of some basic and recent software reliability models

Text-Books:

1. Hoang Pham, System Software Reliability, Springer Series in Reliability Engineering, 2006.
2. Michael R. Lyu, Handbook of Software Reliability Engineering, IEEE COMPUTER SOCIETY PRESS, 1996.

Reference Books:

1. S. Rajasekaran, G. A. Vijayalakshami, Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications, PHI, 2013.
2. Marvin Rausand and Arnljot Hsyland, System Reliability Theory: Models, Statistical Methods, and Applications, Second Edition, JOHN WILEY & SONS, 2004.

**Organization of course**

| Total contact hrs 36 | | |
|---|---|---|
| 1st week: | 10 hrs (classes) | 2 hrs (self-study) |
| 2nd week: | 10 hrs (classes) | 2 hrs (Mid term exam/assessment/discussion) |
| 3rd week: | 10 hrs (classes) | 2 hrs (assessment/discussion) |
| 4th week: | 6 hrs (classes) | 2 hrs (End term exam) |

**Mode of lectures:** online lecture/ discussion

**Course/Project Plan**

| Lecture no. | Topic | Lecture mode | Instructor |
|---|---|---|---|
| L: 1-6 | The Need for System Software Reliability, Software-related Problems, Software Reliability Engineering, Future Problems in the Twenty-first Century, Reliability Measures, | online lecture/ discussion | Dr. Bhoopendra Pachauri |
| L: 7-12 | Common Distribution Functions | online lecture/ discussion | Dr. Bhoopendra Pachauri |

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| L: 13-18 | A Generalized Systemability Function, System Reliability with Multiple Failure Modes, Markov Processes, Counting Processes. | online lecture/ discussion | Dr. Bhoopendra Pachauri |
| L: 19-24 | Point Estimation (MLE and LSE), Using Soft-computing, Non-linear Regression. | online lecture/ discussion | Dr. Bhoopendra Pachauri |
| L: 25-30 | Software vs Hardware Reliability. Software Reliability and Testing Concepts, Software Lifecycle, Software Development Process and its Applications, Software Verification and Validation, Data Analysis, Failure Data Sets. | online lecture/ discussion | Dr. Bhoopendra Pachauri |
| L: 31-36 | Discussion of some basic and recent software reliability models | online lecture/ discussion | Dr. Bhoopendra Pachauri |

**Brief profile of the instructor**

Dr. Bhoopendra Pachauri
Assistant Professor (Selection Grade)
Department of Mathematics and Statistics
Manipal University Jaipur