EE5110: Probability Foundations for Electrical Engineers

July - Nov 2024

Introduction

- **Course**: EE5110, Probability Foundations for Electrical Engineers
- **Instructor**: Venkatesh Ramaiyan (rvenkat@ee.iitm.ac.in)
- **Semester**: July - November 2024
- **Slot(s)**: A (8Mon, 12Tue, 11Thu, 10Fri)
- **Venue**: ESB 128
- **Moodle**: https://courses.iitm.ac.in/course/view.php?id=4801
- **Course Objectives**: The course seeks to provide a rigorous introduction to probability theory and random processes.
- **Syllabus**:
  - Fundamentals of Probability Theory
    - axioms of probability, conditional probability, independence, discrete and continuous random variables, expectation, functions of random variables
  - Applications and Limit Theorems
    - Bayesian inference, parameter estimation, concentration inequalities and convergence, weak law of large numbers
  - Random processes
    - Bernoulli process, Poisson process, finite state Markov chains, strong law of large numbers, convergence
  - Additional topics in Statistical Signal Processing
- **Text and References**:
  1. Dimitri P Bertsekas and John N Tsitsiklis, "Introduction to Probability", Second Edition, Athena Scientific, 2008.
  2. Sheldon M Ross, "A First Course in Probability", Ninth Edition, Pearson Education, 2013.
  3. Henry Stark and John W Woods, "Probability, Statistics and Random Processes for Engineers", Fourth Edition, Pearson Education, 2012.

4. Walter Rudin, "Principles of Mathematical Analysis", Third Edition, McGraw Hill Education, 2017.

- **Prerequisites**: None
- **Course Structure**:
  - Number of lectures (tutorials): 57 (14)
  - Home Work and Assignments: 20 marks
  - Quiz-I (26 Aug 2024) and Quiz-II (7 Oct 2024): 20 marks each
  - Final quiz (11 November 2024): 40 marks
  - Last date to drop: 1 October 2024
- **Grading**: Relative grading
- **Teaching Assistant(s)**:
  1. Akula Raghavendra (ee20b006@smail.iitm.ac.in)
- **Learning Outcomes**: Students will gain a solid understanding of probability theory and stochastic processes, including key distributions, joint distributions, and limit theorems. They will learn to model and analyze random phenomena, apply transform techniques, and solve practical problems using probabilistic methods, enhancing their analytical and communication skills.