

## **Probability and Random Processes**

Review of sets, fields and events, axioms of probability, probability space, conditional probability, independence, Bayes' theorem and applications; repeated trials, Bernoulli trials; discrete, continuous and mixed random variables, probability mass function, probability distribution and density functions; examples of common random variables and density functions; conditional distributions and densities; functions of one and two random variables; moments and characteristic functions of random variables, mean, variance, correlation; Markov, Chebychev and Chernoff bounds; sequences of random variables, strong and weak law of large numbers, central limit theorem; linear mean square estimation and orthogonality principle; maximum likelihood and parameter estimation. Random processes, strict and wide sense stationary processes; ergodic processes; bandlimited and periodic processes; random processes and linear systems; power spectral density; noise processes; Wiener filtering; Kalman filtering; examples of random processes, Poisson process, Markov process.