

Applied Probability Comprehensive Exam Spring 2017

Students are expected to know the following basics from MATH 4740 as they form the basis of MATH 5740 topics.

- Probabilities defined on events and counting methods
- Conditional probabilities
- Independent events
- Bayes' theorem
- Random variables, cumulative distribution functions, probability density functions
- Joint, marginal, and conditional distributions
- Expectation, variance, covariance, and moment generating function of random variables
- Random sample and properties of random samples
- Law of large numbers and central limit theorem
- Binomial, Poisson, normal, and exponential distributions

Students are expected to know the following topics from MATH 5740

- Computing expectations, variances, and probabilities by conditioning
- Markov chains and the Chapman-Kolmogorov equations
- Classification of states
- Long-run probabilities and limiting probabilities of a Markov chain
- Properties of exponential distributions
- Counting processes and Poisson processes
- Interarrival and waiting time distributions
- Brownian motion process
- Hitting times and maximum variable
- Variations of Brownian motion, Gaussian processes

For review of these topics, the following are reference texts.

Math 4740 Probability and Statistics, 4th edition, by M. H. De Groot and M. J. Schervish

- Sections 1.1 – 1.10
- 2.1 – 2.3
- 3.1 – 3.9
- 4.1 – 4.6
- 5.2, 5.4, 5.6

Math 5740 Introduction to Probability Models, 11th edition by Sheldon Ross, Academic Press

- Sections 1.1 – 1.6 Review
- 2.1 – 2.9 Review
- 3.1 – 3.5
- 4.1 – 4.4
- 5.1 – 5.3
- 10.1, 10.2, (10.3, 10.6, 10.7, 10.8 briefly)

Majority of questions will be selected from MATH 5740, but may incorporate some basics from MATH 4740. The pdf or pf of probability distributions will be provided on the exam.