

Statistics 507
Introduction to Stochastic Processes

(see Course Descriptions for the applicable academic year: <http://www.ucalgary.ca/pubs/calendar/>)

Reference Text: "Introduction to Probability Models", eighth edition, by S. Ross, Academic Press. (not necessarily a required text)

The topics below correspond to Sections 2.8, 4.1-4.6, 5.3-5.4, 6.1-6.5, 6.8, 7.1-7.3, 10.1-10.4, 11.2-11.5 in the text by Ross. Additional sections may be covered if time permits (e.g., 4.7-4.7).

Syllabus

<u>Topics</u>	<u>Number of hours</u>
Markov Chains. Classification of states, irreducibility, limit theorems.	5
Absorbing chains. The number of steps to absorption, its mean and variance. The probability of absorption in various states. Generating function techniques on vectors and matrices.	9
Renewal theory. Ordinary and alternating renewal processes. Laplace transform techniques.	4
Poisson processes and generalizations, Continuous-time Markov chains.	10
Brownian motion and stationary processes. Simulation methods.	8
TOTAL HOURS	36

07:07:01
 DS:jml
 Calendar change H(3-1T) to H(3-0) Fall 2009
 Previously known as STAT 407 prior to 2011-12

Course Outcomes

Students successfully completing this course will be able to:

1. Define Markov chains in discrete time, know their properties, classifications of states, stationary probabilities, Chapman-Kolmogorov equation and applications
2. Define Markov chains in continuous time, know their properties, classifications of states, stationary probabilities, Chapman-Kolmogorov equation and applications
3. Construct standard Poisson process using the exponential distribution, know its application
4. Construct different generalization of Poisson process such as compound, mixed, sampled, non-homogeneous Poisson processes, know their applications
5. Construct of the general renewal process and its main properties with some elementary limit theorems for them; solve the renewal equation
6. Define Brownian motion (BM), variation of BM, applications of BM in finance (Black-Scholes formula)
7. Simulate different random variables
8. Define stationary processes and know their applications

08.15.17 (course outcomes added)
RS