University of Regina
Statistics 800–Comprehensive Review of a Selected Topic in Statistics

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References:

- Gregory F. Lawler. *Intersections of Random Walks*, Birkhauser, Boston, MA, 1996.

- Allan Gut. *Stopped Random Walks: Limit Theorems and Applications*, Springer-Verlag, New York, NY, 1988.

Course Description:
The selected topic of review will be random walks. We will study some of the basic properties of simple random walk on the integer lattice $\mathbb{Z}^d$, as well as limit theorems for stopped random walks.

Prerequisites:
No formal prerequisites are required, although this course is offered exclusively for graduate students. It is assumed, however, that students have studied measure theoretic probability at the level of Stat 851, and have knowledge of basic stochastic processes at the level of Stat 862.

Student Responsibilities:
Students should be familiar with all relevant sections of the *Faculty of Graduate Studies and Research Academic Calendar, 2005–2007*. See http://www.uregina.ca/gradstudies for the official version.

Grading Information:
Your final grade will be determined by your performance in the course as follows.

Evaluation Type	Percentage of Final Grade
Assignments	50%
Final Exam	50%

As noted on pages 25–27 of the *Faculty of Graduate Studies and Research Academic Calendar, 2005–2007*, graduate students must achieve a grade of 70% or more in order to receive credit for Stat 800.

Assignments:
The completion of regularly assigned homework will be expected.

Final Exam:
There will be a final exam on Wednesday, June 21, 2006. Logistical details are still to be determined.

Course Outline:

(1) Simple random walk (Lawler, 1.1)

(2) Strong Markov property (Lawler, 1.3)

(3) Discrete potential theory—harmonic functions and Green's function (Lawler, 1.4, 1.5, 1.6)

(4) Harnack inequality (Lawler, 1.7)

(5) Harmonic measure (Lawler, 2.1)

(6) Local central limit theorem (Lawler, 1.2)

(7) Convergence of moments (Gut, A.1)

(8) Modes of convergence (Gut I.1, I.2)

(9) Anscombe's theorem (Gut I.3)

(10) Moment convergence (Gut I.4, I.5, I.6, I.7, I.8)

(11) Law of the iterated logarithm (Gut I.9)

(12) Complete convergence (Gut I.10)