

**DEPARTMENT OF MATHEMATICS, NORTHEASTERN UNIVERSITY**

**MTH U581: Statistics and Stochastic Processes.**

Spring 2008

**Class:** M,W,Th 4:35-5:40 pm in 157 RY

**Instructor:** Prof. Chris King

**Office:** 437 Lake; phone 373-3905; king@neu.edu

**Office hours:** M,W 11:45 - 1:15 pm

**Course Webpage:** [http://www.math.neu.edu/~king\\_chris/581Sp08/581Sp08.html](http://www.math.neu.edu/~king_chris/581Sp08/581Sp08.html)

**Texts:** “An Introduction to Mathematical Statistics and its Applications”, R. Larsen and M. Marx, fourth edition. (published by Prentice Hall). Additional material will be taken from the online text “A GNU Book: Grinstead and Snell’s Introduction to Probability” from the CHANCE project, can be downloaded at <http://www.dartmouth/~chance/>.

**Grading:**

There will be several in-class quizzes, and the two-hour departmental final. Homework problems will be assigned each week.

**List of possible topics:** (subject to change as time allows)

- 1). Review of discrete distributions; review of continuous distributions.
- 2). Simulation of continuous random variables (inverse method, rejection method). Applications: Monte Carlo method.
- 3). Asymptotics for the binomial distribution (Poisson, normal, large deviations). Applications: asymptotic equipartition property, entropy.
- 4). Weak law of large numbers (Chebyshev inequality), Central limit theorem. Applications: random walk.
- 5). Discrete Markov chains (classification and asymptotics). Applications: Gambler’s ruin, branching processes.
- 6). Hidden Markov models. Applications: bioinformatics.
- 7). Random walk and option pricing. Applications: Black-Scholes formula.
- 8). Regression. Applications: data analysis.

## **IMPORTANT:**

1. The best way to learn this material is to do the homework problems every week. Assignments will be posted on the course webpage (see address above).

Please ask me questions about things you don't understand, either in class or at my office. **DONT** wait until you feel completely lost!

2. It is your responsibility to be aware of any changes the instructor may make to the syllabus as they are announced in class, or as posted on the course webpage. Students are responsible for all information given when they are absent.

3. This is a Calculus-based course, and assumes a working knowledge of single-variable calculus as well as some acquaintance with multi-variable calculus (including multiple integration).

4. The grade I (Incomplete) will be given only if you have a good attendance record, have missed the Final for a good reason, and otherwise you are doing passing work. Makeup exams are not given unless you have missed the exam for a valid reason and can prove it. Both makeups and incomplete are given at discretion of instructor.

5. Cheating will not be tolerated. All incidents of cheating will be reported to the Office of Judicial Affairs. The University's cheating policy and related disciplinary actions are detailed in the Student Handbook. The Handbook also includes a description of what is considered cheating by the University. Cheating in this class includes (but is not limited to): looking at the papers of others during a quiz or test, talking to other students during a quiz or a test.

6. If you have a concern about the course or the instructor that is not or cannot be resolved by speaking with the instructor, the next step is to speak with the course coordinator. If the course coordinator does not settle the matter, please contact Professor A. Martsinkovsky (the undergraduate advisor), 471 LA, x5510.

7. It is University policy that no grade, including an incomplete, can be changed after one year. Exceptions must be authorized by the Academic Standing Committee.

8. **All students without legitimate conflicts will take the final exam at the scheduled date and time (TBA). Do not make travel plans that conflict with the final exam.**