STA 103 *Probability and Statistical Inference*

Spring 2002
Tue Thu 10:55am – 12:10pm
139 Social Science Building

* **Class Web Page:** `http://www.stat.duke.edu/courses/Spring02/sta103`

I. **Instructor: Somesh Chattopadhyay** (somesh@stat.duke.edu)

Phone: 684–5956
Office: 223 Old Chem Bldg
Office hours: Tue 4:00pm – 5:00pm, Thu 12:30pm – 1:30pm, or by appointment.

II. **Teaching Assistants:**

Jen-Hwa Chu	Tao Jiang (Tom)	Eugene Roy Son
E-mail: jc26@duke.edu	E-mail: tj1@duke.edu	E-mail: ers13@duke.edu
Office Hours: TBA	Office Hours: TBA	Office Hours: TBA

III. **Help Sessions:**

There will be help session from Sunday through Thursday two hours each day. The time and place will be announced later. You are strongly encouraged to make use of the help sessions and the office hours.

IV. **Overview:**

This course is an introduction to probability and statistical inference aimed primarily at students majoring in economics and quantitative social sciences. It begins with discussion of basic concepts of probability, random variables, and common probability distributions. The last two-thirds of the course cover a broad range of statistical inference concepts, including sampling distributions, hypothesis testing, and regression models, with an emphasis on those topics that will be most helpful in preparing students for further study in economics (or other quantitative social sciences).

V. **Topics:**

- Basic concepts of probability (Venn diagrams, union/intersection of events, etc.)
- Conditional probability, independence/dependence, Bayes' theorem
- Discrete and continuous random variables, cumulative distribution functions
- Expectation of a function of a random variable (expected value, variance, etc.)
- Bivariate distributions, marginal and conditional distributions, covariance, correlation
- Sampling distributions, central limit theorem, normal approximation to the binomial distribution
- Evaluating the "goodness" of an estimator (bias, mean square error, etc.)
- Confidence intervals, hypothesis testing, calculating type II error
- Introduction to maximum likelihood estimation
- Simple linear regression and multiple linear regression with two explanatory variables (least squares method, significance testing, R^2, etc.)

VI. **Prerequisites:** One semester of calculus at the level of Duke's MTH31.

VII. **Course Materials:**

- **Required text:** *Mathematical Statistics with Applications* (6th ed.), by Wackerly, Mendenhall, and Scheaffer.
- **Optional solutions manual:** The text has a corresponding Student Solution Manual. Once again, this is optional.
- **Computer software:** For some exercises, we will be using S-Plus 2000 for Windows. This software is available in public Windows clusters on campus. It is also available for download free to STA103 students. Downloading instructions are available on the class web page.

- **Calculators:** You will need a calculator that is capable of basic operations such as logarithms, exponentiation, taking numbers to a power, etc. It does not need to be programmable, to be capable of displaying graphs, etc. You will need your calculator to take quizzes and exams.

VIII. Labs: Weekly computer labs (using S-Plus for Windows) supplement the formal lectures. Students are led through these labs by a teaching assistant.

IX. Grading: Weekly quizzes (20%), two midterm exams (each 25%), and a comprehensive final exam (30%).

X. Course Policies

- **Homework:** Suggested problems and solutions will be posted as we go along. These problems are intended to help you gauge your progress and to aid you as you begin to review the material, so they will not be graded. Please do not take these problems as the sole indicator of what you may be asked in an exam or quiz.
- **Quizzes:** Quizzes will be administered weekly either during the lecture hours or in sections during the lab hours. They may be cumulative in nature. You must take quizzes in your assigned section if it is administered during the lab hours. Your lowest quiz grade will be dropped.
- **Exams:** There will be two midterm exams and one final exam. The date for the final is set by the Registrar's office and cannot be changed by the teaching staff.
  Midterm 1: Thursday, February 14 (tentative)
  Midterm 2: Tuesday, March 26 (tentative)
  Final: Friday, May 3, 7:00pm - 10:00pm
- **Quiz/exam regrades:** You have two weeks after the administration date to request a regrade of a quiz or exam. Submit a written request detailing the nature of the grading error to your TA along with the relevant quiz or exam. Please keep in mind that papers submitted for regrade may be reviewed in their entirety, possibly resulting in a net gain or a net loss of points.
- **Absences:** In order to be excused from quizzes or to reschedule exams, you must provide a Dean's excuse. Athletic schedules, personal/family vacations, reports of illness, and other less official excuses are not acceptable. The only exception to this policy will be for out-of-town job, graduate school, and professional school interviews. In this case, a letter or interview schedule on the letterhead of the company/school will be accepted. No make-up exams/quizzes will be given (except for the final exam). If you miss an exam/quiz and have a deans excuse or interview certification, your weight for the missed exam/quiz will be distributed to the other exams/quizzes.
- **Attendance:** The students are expected to come to the class regularly and participate in the class. Attendance will be taken and may be used to decide the final course grade for those who fall on the borderline of two grades.