ST521-001 & ST521L: Statistical Theory I

Lecture:	MWF 11:20-12:10, W 12:25-1:15
Classroom:	Mann 425
Instructor:	Wenbin Lu
Office Hrs.:	M 2-4pm (or by appointment), 210E Patterson
Course Page:	http://www4.stat.ncsu.edu/∼lu/ST521/ST521.html

TA:	Ye Liu and Dhruv Sharma
Office Hrs.:	W, F 1:20-2:20pm & TH 11:00am - 12:00pm
Venue:	Patterson 9
Mailbox:	Patterson 314

General Information:

- You MUST be enrolled in both ST521 and ST521L.
- **Coreq**: MA511 and MA425 (or, Linear Algebra, Advanced Calculus)
- **Textbook:** *Statistical Inference*, by George Casella and Roger L. Berger, 2nd Edition, 2001 Duxbury, ISBN 0-534-24312-6
- **Correspondence:** The preferred manner of correspondence is e-mail. Important announcements will be sent to the class via e-mail, so make sure that your e-mail address is registered with university's automatic mailing list. Requests for manual addition of e-mail addresses will not be entertained.

Course Objective

A primary objective of the ST521-2 course sequence is to present techniques and basic results of probability and mathematical statistics at a rigorous and advanced calculus level.

In ST521 we develop the probabilistic tools and language of mathematical statistics. The course describes probabilistic models for and properties of random variables, common probability distributions, and large sample results. In the second semester course, ST522, the structure of statistical inference procedures is studied. In particular, the theory of estimation, confidence sets, hypothesis testing, and prediction for common parametric models are investigated.

Students taking the course will have completed three semesters of calculus and had some exposure to basic probability and statistics. ST521-2 is a required sequence for Masters students majoring in Statistics and for Ph.D. students minoring in Statistics. A related sequence, ST793-4, presents similar material at the advanced measure-theoretic level.

Course Material

In ST521 we shall cover most of the material in Chapters 1 through 5 of Casella & Berger.

1. Probability Theory: axiomatic foundations, conditional probability, random variables, probability distributions.

2. Transformations and Expectations: functions of random variables, expected values, moment generating functions.

3. Families of Distributions: discrete and continuous distributions, exponential family, location and scale family.

4. Random Vectors: joint, marginal and conditional distributions, hierarchical and mixture models, covariances.

5. Sampling Distributions and Convergence: random samples, sums of random variables, convergence concepts.

Homework & Exams

- **Homework:** Homework is assigned weekly and should be submitted on or before due date. **Copying will disqualify you and will lead to disciplinary actions**.
- **Exams:** There will be one Midterm exam and one Final exam. Both exams are closed book and closed notes. You may use one formula sheet (two-sided) for Midterm, and two formula sheets for the final. Final exam will be *comprehensive*.

  Please arrange your travels based on the following scheduled exams NOW.

Midterm	Oct. 8 (Wed.)	11:20 am - 1:15pm	Chapter 1-3
Final	Dec. 10 (Wed.)	1 - 4 pm	Chapter 1-5

- **Grading policies**: Plus/minus grading will be used for each grade level.

  Final Score = 20% Homework + 30% Midterm Exam + 50% Final Exam.

Important Dates:

No-class dates:	Sep. 1 (Labor day), Oct. 9–10 (Fall Break), Nov. 26–28 (Thanksgiving)
Exam dates:	Oct 8 (Midterm Exam), Dec. 10 (Final Exam)
Tentative homework due:	Aug. 29, Sep. 8, 15, 22, 29, Oct. 6, 20, 27, Nov. 3, 10, 17, Dec 1

Learning Tips:

1. Try to show up in all the lectures. Make good notes.

2. Ask questions in class. Your questions may be others' as well. No questions are too elementary, and all deserve to be answered.

3. Discuss with your classmates about your questions. It is perfectly acceptable to work together on homework assignments.

4. Finish homework in time. If you run into problems, bring them up to me or TA ASAP.

Integrity:

University regulations require that every course syllabus remind students that the Code of Student Conduct defines a university policy on academic integrity already pledged by each student. Instructors assume that the students' names on their submitted work imply compliance with this policy. See http://www.fis.ncsu.edu/ncsulegal/41.03-codeof.htm