Course Title: Biostatistics Theory II
Course Number: BIST 0614
Course Location: Rutgers SPH, RM234, Piscataway
Course Date & Time: 2:40-5:30 pm on Wednesdays
Course Instructor: Shou-En Lu, PhD. Associate Professor of Biostatistics, Rutgers School of Public Health, Rm 220
shouen.lu@rutgers.edu
732 235 9764
Office Hours: 1:30-2:30pm on Wednesdays or by appointment
Course Assistant: TBA
Required Course Text:
Additional/Supplemental Readings/Resources:
Course Description: This course will cover theory of estimation and hypothesis testing. Topics include sampling distributions, sufficiency, unbiasedness, maximum likelihood methods (estimation and tests). Emphasis is on the fundamental concepts underlying the theory.
Selected Department Competencies Addressed: Each Department identifies competencies for each degree offered. The competencies addressed in this course for the MS and DrPH for the Department of Biostatistics include:
- Apply probability and statistical methods to design experimental and observational studies in biomedical, clinical and public health research;
- Use probability and statistical theory to evaluate and identify appropriate methods of analysis;
- Conduct appropriate statistical analysis of data to solve medical and public health problems;
Course Objectives: By the completion of this course, students will be able to:

1. Apply probability and statistical methods to important statistical problems.
2. Use the properties of a random sample and principle of data reduction.
3. Perform statistical inference of point estimation, interval estimation and hypothesis testing.
4. Apply basic probability and standard statistical methods to design experimental and observational studies in biomedical, clinical and public health research.

Course Requirements and Grading:

- Course Evaluation Description:
  1. Midterm Exam 35 pts.
  2. Final Exam 35 pts.
  3. Homework Assignment 30 pts.
  Total: 100 pts.

- Grading policy:
  1. On all homework assignments/problem sets, students are encouraged to discuss with one another, but work should be carried out and written up independently. If any two identical write-ups are found, both homework assignments are considered failed.
  2. It's the students' responsibility to make their papers legible. Unreadable work will NOT be graded.
  3. The students are asked to answer each question as accurately and concisely as possible. If it is necessary to attach the computer output with the homework assignment, ONLY the "essential" segments are required. Do NOT submit the complete output section or the log file. Otherwise, 50% points will be taken away.
  4. Unless notifying the instructor beforehand, late submission of homework will NOT be graded.

Course Schedule:

<table>
<thead>
<tr>
<th>Date</th>
<th>Topics</th>
<th>Readings</th>
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<tbody>
<tr>
<td>1</td>
<td>1/22/14 Convergence in Probability and in Distribution.</td>
<td>Chp 4.2-4.3</td>
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<tr>
<td>2</td>
<td>1/29/14 Convergence in Distribution, Delta Method, and Central Limit Theorem. Interval estimation</td>
<td>Chp 4.3-4.4, 5.1, 5.4</td>
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<tr>
<td>3-5</td>
<td>2/5/14 Maximum Likelihood Method –MLE, Fisher's information, asymptotic normality, R-C lower bound and efficiency, 2/12/14 2/19/14 Maximum Likelihood Method- Multi-parameter cases</td>
<td>Chp 6.1, 6.2, 6.4</td>
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<td>6-8</td>
<td>2/26/14 3/5/14 3/12/14 Sufficiency- sufficient statistics, completeness and uniqueness, the exponential class of distributions, UMVUE</td>
<td>Chp 7.3, 7.4, 7.5</td>
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<td>9</td>
<td>3/19/14 Spring Break</td>
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<tr>
<td>Date</td>
<td>Subject</td>
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<tr>
<td>3/26/14</td>
<td>Midterm</td>
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<tr>
<td>4/2/14</td>
<td>Hypothesis testing—the basic</td>
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<td>4/9/14</td>
<td>Chp 5.5, 5.6</td>
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<tr>
<td>4/16/14</td>
<td>Maximum Likelihood Method-Maximum likelihood tests, Multi-parameter cases: testing</td>
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<td>4/23/14</td>
<td>Chp 6.3, 6.5</td>
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<tr>
<td>4/30/14</td>
<td>Optimal Tests of Hypotheses</td>
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<td>5/7/14</td>
<td>Chp 8.1, 8.2</td>
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<tr>
<td>5/16/14</td>
<td>Review</td>
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<tr>
<td>5/23/14</td>
<td>Final Exam</td>
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*The above course schedule provides a general plan for the course; some deviations may be necessary.

**School of Public Health Honor Code:** The School of Public Health Honor Code is found in the student bulletin (sph.rutgers.edu/academics/catalog/index.html). Each student bears a fundamental responsibility for maintaining academic integrity and intellectual honesty in his or her graduate work. For example, all students are expected to observe the generally accepted principles of scholarly work, to submit their own rather than another’s work, to refrain from falsifying data, and to refrain from receiving and/or giving aid on examinations or other assigned work requiring independent effort. In submitting written material, the writer takes full responsibility for the work as a whole and implies that, except as properly noted by use of quotation marks, footnotes, etc., both the ideas and the works used are his or her own. In addition to maintaining personal academic integrity, each student is expected to contribute to the academic integrity of the school community by not facilitating inappropriate use of her/his own work by others and by reporting acts of academic dishonesty by others to an appropriate school authority. It should be clearly understood that plagiarism, cheating, or other forms of academic dishonesty will not be tolerated and can lead to sanctions up to and including separation from the Rutgers School of Public Health.

**Policy Concerning Use of Recording Devices and Other Electronic Communications Systems:**

When personally owned communication/recording devices are used by students to record lectures and/or classroom lessons, such use must be authorized by the faculty member or instructor who must give either oral or written permission prior to the start of the semester and identify restrictions, if any, on the use of mobile communications or recording devices.
Appendix

Academic Year 2013-2014

FALL

September 3  Fall Semester Begins
November 26    THURSDAY CLASSES MEET (No Tuesday Classes)
November 27    FRIDAY CLASSES MEET (No Wednesday Classes)
November 28 - December 1    Thanksgiving Recess
December 11    Regular Classes End
December 12 - 13    Reading Days
December 16 - 23    Final Exams
December 24    GRADES DUE!

SPRING

January 21    Spring Semester Begins
March 15 - 23    SPRING BREAK - NO CLASSES
May 5    Regular Classes End
May 6 - 7    Reading Days
May 8 - 14    Final Exams
May 15    GRADES DUE!
May 18    University Commencement

SUMMER

May 27    Summer Semester Begins
August 13    Summer Semester Ends
August 14    GRADES DUE!