Instructor.  Chenxi Li, PhD
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Class meets. Tuesday and Thursday 12:40 – 2:00 pm in A131 Fee Hall

Office hours. Tues. and Thurs., right after the lecture.

Prerequisites. MTH 309/314, 421

Text. Larry Wasserman, "All of Statistics", Springer.

Course Website. d2l.msu.edu (log in with your MSU NetID and password)

Course. EPI 808B is designed for master students in biostatistics, but students from other disciplines are welcome to attend if they are adequately prepared. EPI 808B is the first course on probability and statistical inference for students in biostatistics with a background in multivariate calculus and matrix algebra. EPI 808 covers introduction to probability; discrete and continuous random variables; bivariate and multivariate distributions; central limit theorem and other asymptotic theory; estimation theory; methods of moments; maximum likelihood methods; hypothesis testing; power; likelihood ratio, score, and Wald tests; Wilcoxon rank sum test and other nonparametric tests; confidence sets; introduction to linear regression.

This course focuses on principles, methods and theory of statistical inference that are foundations for other courses in biostatistics. The homework and exam problems are usually direct applications of theory taught in class, but some may involve light math derivation and proof to test students’ comprehension of the course content. All numerical exercises can be carried out on a calculator. Statistical software such as SAS will NOT be taught in this course. EPI 851 and 852 (course sequence in SAS programming) are recommended for students who wish to learn SAS to perform data management as well as to generate descriptive statistics and plots. SAS programming for data analysis will be taught in courses of particular biostatistical methods (e.g. EPI 826B and EPI 920).

Grading. Final grades will be based on the two midterm exams (20% each), the final exam (30%), and written homework (30%). There will be no make-up exams (unless it is documented with medical conditions). A reasonable amount of collaboration on homework assignments is allowed, but each student must write up final answers on their own.

Exams. All exams are closed book. Students are allowed to bring one formula sheet (8.5” x 11”, double-sided ok) to each midterm exam and two formula sheets to the final exam. Students also need to bring their calculators for the exams.

Homework. Homework (about 6 assignments) and deadlines will be announced in class. Students are encouraged to hand in homework to the instructor in class. No late homework.
**Academic integrity.** All Michigan State University policies regarding academic integrity apply to this course. For details, see [https://www.msu.edu/~ombud/academic-integrity/index.html](https://www.msu.edu/~ombud/academic-integrity/index.html)

**Tentative list of topics and schedule.**

**Weeks 1 & 2:**
- Section 1.1 – 1.7; Section 2.1 - 2.4

**Weeks 3 & 4:**
- Section 2.5 – 2.12; Section 3.1 - 3.5;
- Section 4.1 – 4.2; Section 5.1 – 5.5;
- Section 6.1 – 6.2

**Weeks 5 & 6:**
- Section 6.3; Section 7.1 – 7.2;
- Section 9.2– 9.10

**Weeks 7 & 8:**  
10/16 (Tuesday): Midterm I  
- Section 10.1 – 10.4; 10.6, 10.8, 10.10.2

**Weeks 9 & 10:**
- Section 10.7;
- Tests in nonparametric models;
- Confidence sets by pivotal quantity;
  (provided in Lecture Notes)

**Weeks 11 & 12:**  
11/13 (Tuesday): Midterm II  
- Confidence sets by inverting acceptance region of tests;
- Correlation coefficient and rank correlation;
- Q-Q plot  
  (provided in Lecture Notes)

**Weeks 13 & 14:**
- Section 13.1-13.5
  (These two weeks’ material will be taught only if my teaching pace is on schedule)

**Week 15**  
Review

**Exam Week**  
Final Exam 12/13 (Thursday):  
Time (12:45 - 2:45 pm)