STAT:7101 Advanced Inference II (Spring 2021)

Time and Location MWF 9:30AM-10:20AM on Zoom.

Instructor Jian Huang
Statistics and Actuarial Science
University of Iowa
Office: 271 SH, Phone: 335-0823
Email: jian-huang@uiowa.edu

Departmental Executive Officer Professor Kung-Sik Chan, 241 SH, Phone: 335-0712.

Prerequisites STAT:7100.

Delivery Mode Web via Zoom. This course utilizes real-time instruction on Zoom MWF 9:30AM-10:20AM. Students are expected to attend the class on Zoom at the specified times.

Walk-in Hours MWF 8:30AM-9:30AM on Zoom or by appointment. Students are invited to drop by on Zoom during these hours to discuss questions about the course material or concerns. I am also available by appointment if you are unable to attend my walk-in hours.

Office Hours MWF 10:30 AM -11:20 AM or by appointment.

Required Textbook

- Van der Vaart (1998). *Asymptotic Statistics.* Cambridge University Press.

  References

- Cox D. R. and Hinkley, D. V. (1974). *Theoretical Statistics.* Chapman & Hall.

- Van der Vaart A. W. and Wellner, J. A. (1996). *Weak Convergence and Empirical Processes.* Springer, New York.

- Suggested reading materials.

Exams and projects There are two in-class midterm exams [on March 5 (Friday) and April 16 (Friday)] and a final project. Each student is expected to give an oral presentation based on the project.

Homework Homework is an important component of the course. It will be assigned weekly and must be turned in by the beginning of class on the day they are due. Unless prior arrangements are made, late homework will not be accepted.

Attendance Attendance at lectures and participation in discussions are expected. Failure to attend class regularly will affect your grade.

Grading Homework, 30%, midterm 1, 25%, midterm 2, 25%, project, 20%. Grade will be determined by the weighted total score. Scale runs like the following (and I may adjust it a little): A (90-100), B (75-89), C (55-74), D (40-54). A plus-minus grading system will be used.

Course Objectives

To equip Ph.D. students in statistics, biostatistics and related fields with a solid background in mathematical statistics that will be helpful to their future work and research in statistics and related fields.

Topics to Be Covered

1. Comparisons of estimators (Chapters 6-8)

   Contiguity
   Local asymptotic normality
   Relative efficiency of estimators

2. Topics in classical nonparametric statistics (Chapters 11-14)

   Projections
   U-statistics
   Rank, sign and permutation tests
   Relative efficiency

3. Likelihood ratio and chi-square tests (Chapters 16-17)

   Likelihood ratio tests
   Rao's score and Wald's tests
   Chi-square tests
   Asymptotic behavior under nonstandard conditions

4. Empirical processes (Chapter 19)

   Applications in statistics and machine learning

5. Selected topics (Chapters 20-25), if time permits

   Functional delta method
   Bootstrap
   Semiparametric models

Additional UI and CLAS Policy and Procedures

Administrative Home The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall or see the CLAS Student Academic Handbook `www.clas.uiowa.edu/students/academic/handbook/index.shtml`.

Electronic Communication University policy specifies that students are responsible for all official correspondences sent to their standard University of Iowa e-mail address (@uiowa.edu). Students should check this account frequently. (Operations Manual, III.15.2. Scroll down to k.11.)

Accommodations for Disabilities A student seeking academic accommodations should first register with Student Disability Services and then meet privately with the course instructor to make particular arrangements. See `www.uiowa.edu/~sds/` for more information.

Academic Fraud All CLAS students have, in essence, agreed to the College's Code of Academic Honesty: "I pledge to do my own academic work and to excel to the best of my abilities, upholding the IOWA Challenge. I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled (CLAS Academic Policies Handbook).

CLAS Final Examination Policies Final exams may be offered only during finals week. No exams of any kind are allowed during the last week of classes. Students should not ask their instructor to reschedule a final exam since the College does not permit rescheduling of a final exam once the semester has begun. Questions should be addressed to the Associate Dean for Undergraduate Programs and Curriculum.

Making a Suggestion or a Complaint Students with a suggestion or complaint should first visit the instructor, then the course supervisor, and then the departmental DEO. Complaints must be made within six months of the incident. See the CLAS Student Academic Handbook.

Understanding Sexual Harassment Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI Comprehensive Guide on Sexual Harassment at `www.uiowa.edu/~eod/policies/sexual-harassment-guide/index.html` for assistance, definitions, and the full University policy.

Reacting Safely to Severe Weather In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the Public Safety website `http://www.uiowa.edu/~pubsfty/intlinks.htm`.

Student Classroom Behavior The ability to learn is lessened when students engage in inappropriate classroom behavior, distracting others; such behaviors are a violation of the Code of Student Life. When disruptive activity occurs, a University instructor has the authority to determine classroom seating patterns and to request that a student exit the classroom, laboratory, or other area used for instruction immediately for the remainder of the period. One-day suspensions are reported to appropriate departmental, collegiate, and Student Services personnel (Office of the Vice President for Student Services and Dean of Students).