Syllabus

STAT 5122/6022 Mathematical Statistics II Spring 2026

Tuesdays/Thursdays, 8 am – 9:20 am at 60WCHARL 115

Instructor: Dr. Xuan Cao, Associate Professor

Office: 5306 French Hall West

E-mail: xuan.cao@uc.edu (mailto:xuan.cao@uc.edu) (Most efficient way of communication)

Office Hours: Tuesday 12:30 pm -2:30 pm in my office or by appointment

Personal Website: http://homepages.uc.edu/~caox4/ ⤵ (http://homepages.uc.edu/~caox4/)

Course Description: The purpose of the course is to introduce the theory of statistical inference. Specific topics include order statistics, point and interval estimation, hypothesis testing, consistency, central limit theory, maximum likelihood estimation, Rao- Blackwell Theorem and Rao-Cramér lower bounds, likelihood ratio tests, exponential family, quality of an estimator, sufficiency, Neymann-Pearson lemma and its applications.

Textbook: Introduction to Mathematical Statistics, 8e, by Hogg, McKean & Craig

Course Webpage: All course-related information will be posted on UC Canvas, including course syllabus, handouts, homework assignments and announcements. Visit Canvas frequently.

Midterm and Final Exam:

Midterm Exam 1: Thursday, Feb 19, in class

Midterm Exam 2: Thursday, Mar 27, in class

Final Exam: Thursday, April 23, in class

All tests (midterm/final exam) are closed-book.

- You will need to bring a calculator for each test. Cell phones should not be used during tests.
- Academic misconduct including act of cheating will not be tolerated.

Homework: Homework will be assigned from each chapter or each topic.

- Homework will be assigned on Canvas throughout the semester.
- Please note that your solutions need to be presented in a clear, readable format with sufficient details. NO CREDIT will be given to solutions lacking details or that are hard to read.
- All students must submit their own written work in their own words. Academic misconduct including plagiarism will not be tolerated.

- Homework must be scanned into **one single pdf file** and submitted online by the due date specified on Canvas.
- **One homework with the lowest score** will be dropped before counting the final points. **No late assignments will be accepted. Use your drops wisely!**

Semester Grade Calculation: Your final course grade will be assigned based on the total points that you have accumulated from

Attendance: 5 pts Homework: 20 pts Midterm Exam I: 25 pts Midterm Exam II: 25 pts Final Exam: 25 pts

out of the maximum possible **100 points**, according to the following grading scales:

A: 92 -100 pts, A-: 89 -91pts, B+: 86 – 88 pts, B: 83 -85 pts, B-: 80 – 82 pts, C+: 76 – 79 pts,

C: 72 – 75 pts, C-: 69 - 71pts, D+: 66 – 68 pts, D: 63-65 pts, D-: 60 – 62 pts, F: 59 or less pts

Please note STAT 6022 is a graduate level course. If you are enrolled in STAT 6022, an "F" will be assigned for a letter grade scale equal to C- or below.

About Withdrawal: The last day to withdraw online from the course is Friday, April 10. In case a withdrawal shall occur, the instructor will be required to affirm whether or not you minimally participated in the class. Although the instructors will do the best to answer accurately, in the absence of any evidence to the contrary the instructors will affirm that you did **not** minimally participate. Ways for you to provide clear evidence of your presence in the class include submitting a homework.

Academic Integrity Policy: The University Rules, including the Student Code of Conduct, and other documented policies of the department, college, and university related to academic integrity will be enforced. Any violation of these regulations, including acts of plagiarism or cheating, will be dealt with on an individual basis according to the severity of the misconduct. (**http://www.uc.edu/conduct/Academic_Integrity.html** ⊟ (**http://www.uc.edu/conduct/Academic_Integrity.html)**)

Regarding Policy: If a student believes that a grading error has occurred, he/she should request for regarding within the next 5 days after the work is returned to the class. This will apply even if the student is absence in the class on the day the work is returned unless prior permission was obtained from the instructor.

Policy about Make-Up Exam: There will be no scheduled make-up examinations. Only students with legitimate excuses will be allowed to make up missed exam. The student must contact the instructor **before the examination date** after one of the following excusable events occurs:

1. **Illness**. Need official certification from you doctor, typed on medical stationary (with their license # to practice medicine on it).
2. **Attending the funeral of an immediate relative**. Need proof of attending the funeral with the date of the ceremony.

3. **Mandatory courtroom appearance**. Need a copy of your official court summons with the date.
4. **Winthrop Athletic event participation**. Need a signed letter from your coach no later than **one week prior to** the day of the exam.

Special Needs Policy: If you have any special needs related to your participation in this course, including identified visual impairment, hearing impairment, physical impairment, communication disorder, and/or specific learning disability that may influence your performance in this course, you should meet with the instructor to arrange for reasonable provisions to ensure an equitable opportunity to meet all the requirements of this course. At the discretion of the instructor, some accommodations may require prior approval by Disability Services. In order to take advantage of those available accommodations, students may contact the Disability Services Office at 210 University Pavilion (513-556-6823). (**http://www.uc.edu/aess/disability.html** ⇨ **(http://www.uc.edu/aess/disability.html)**)

Personal Communication Devices Policy: Cell phones and PDAs must be either turned off or put on vibrate mode during class. Additionally, please make all efforts not to use cell phones during the class time. **Cell phone usage is strictly prohibited during exams**.

Email Communication Policy: All communications will be done via UCmail. The instructor will try her best to reply within 24 hours from receipt of emails.

Tentative Schedule (subject to change)

Week	Topic	Reading Assignment
1	Order statistics	4.4
2	Hypothesis testing	4.5-4.7
3	Convergence in probability ; Convergence in distribution	5.1-5.2
4	Convergence in distribution (continued); Central Limit Theorem	5.3

5	Maximum Likelihood Estimation	6.1
6	Maximum Likelihood Estimation (continued) **Midterm 1**	6.1
7	Rao-Cramér lower bound and efficiency	6.2
8	Rao-Cramér lower bound and efficiency (continued)	6.2
9	Maximum likelihood test	6.3
10	No class (Spring break)	
11	Maximum Likelihood test (continued) **Midterm 2**	6.3
12	Sufficient statistic; factorization theorem; exponential class of distribution	7.2, 7.5
13	Minimal sufficiency; Ancillary statistics; Sufficiency	7.4, 7.7
14	Completeness and independence	7.8, 7.9

15	Quality of an estimator (MSE and UMVUE)	7.1, 7.3, 7.4
	Final Exam	