

Syllabus

STAT 7031 Statistics Theory Fall 2025

WF 8:00 am-9:20 am at 60WCHARL 115

Instructor: Dr. Xuan Cao, Associate Professor

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

Office Hours: *12:30-1:30 pm Wednesdays (In-person) and 3-4 pm Fridays (Zoom <https://ucincinnati.zoom.us/j/88476090370> ↗ (<https://ucincinnati.zoom.us/j/88476090370>)) or by appointments*

Personal Website: <http://homepages.uc.edu/~caox4/> ↗ (<http://homepages.uc.edu/~caox4/>)

Course Description: The course will cover the following topics in depth: distribution theory, estimation, hypotheses testing, asymptotic behavior of statistics, basics of Bayesian methods, and decision theory.

Prerequisites: To take this course you must: Have taken the following Course STAT6022 min grade B-.

Textbook: Casella and Berger (2002). Statistical Inference, 2nd ed.

Wasserman (2004). All of Statistics: A concise course in statistical inference.

Lehmann and Romano (2005). Testing Statistical Hypotheses, 3rd ed.

Hogg, McKean and Craig (2018). Introduction to Mathematical Statistics, 8th ed.

Course Webpage: All course-related information will be posted on UC Canvas (<https://uc.instructure.com/>), including course syllabus, handouts, homework assignments and announcements. Visit Canvas frequently.

Midterm and Final Exam:

Midterm Exam 1: Wednesday, Sep 24, 8 am to 9:20 am

Midterm Exam 2: Wednesday, Oct 29, 8 am to 9:20 am

Final Exam: Wednesday, Dec 10, 8 am–10 am

All tests (midterm/final exam) are **closed-book**. The chapters to be covered in Midterms will be announced one week before the examination date.

Homework: Homework will be assigned from each chapter.

- 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 one drop 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: 15 pts Midterm Exam I: 25 pts Midterm Exam II: 25 pts Final Exam: 30 pts

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

A: 90 -100 pts, A-: 87 -89 pts, B+: 84 – 86 pts, B: 81 - 83 pts, B-: 78 – 80 pts, C+: 74 – 77 pts,

C: 70 – 73 pts, C-: 67 - 69 pts, F: 66 or less pts

Please note STAT 7031 is a graduate level course. If you are enrolled in STAT 7031, an “F” will be assigned for a letter grade scale equal to C- or below.

About Withdrawal: The last day to withdraw from the course is Friday, November 21. 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 )

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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 your 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. **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 Accessibility Resources. In order to take advantage of those available accommodations, students may contact the Accessibility Resources Office at Commons Edge North Pavilion (www.uc.edu/accessibility)

(<https://nam11.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.uc.edu%2Faccessibility&data=05%7C01%7Ccaox4%40UCMAIL.UC.EDU%7C4651ab9f4b9642b8c91c08dba013eff7%7Cf5222e6c5fc648eb8f0373db18203b63%7C0%7C0%7C638279779714400984%7CUnknown%7CTWFpbGZsb3d8eyJWljoIMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6Ikl1haWwiLCJXVCi6Mn0%3D%7C3000%7C%7C%7C&sdata=atgRxQdiE1hT9HsaIXUmJgsHQ1x4be9hW1Weu%2FOpI%2FA%3D&reserved=0>).

Ohio law and the University's Student Religious Accommodations for Courses Policy 1.3.7 permits a student, upon request, to be absent for reasons of faith or religious or spiritual belief system or participate in organized activities conducted under the auspices of a religious denomination, church, or other religious or spiritual organization and/or to receive alternative accommodations with regard to examinations and other course requirements due to an absence permitted for the above-described reasons. Not later than fourteen days after the first day of instruction in the course, a student should provide the instructor with written notice of the specific dates for which the student requests alternative accommodations. For additional information about this policy, please contact the Executive Director of the Office of Equal Opportunity and Access at (513) 556-5503 or oeohelp@UCMAIL.UC.EDU.

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 or laptops 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.

Chapters to Cover (not necessary in the order given)

Topic 1: Probability. Wasserman (2004) Selected sections in Chapters 1-5

Topic 2: Exponential Family and UMVUE. Casella and Berger (2002) Section 3.4, 3.5, 6.1, 6.2, 7.3

Topic 3: Bayesian Estimation and Decision Theory. Casella and Berger (2002) Section 7.2;
Wasserman (2004) Chapter 12

Topic 4: Consistency and Asymptotic Efficiency. Casella and Berger (2002) Section 10.1

Topic 5 Hypothesis Testing. Hogg et al. (2018) Section 4.5, 6.3, 6.5, 8.1, 8.2, 8.3; Lehmann and Romano (2005) Chapter 3.1, 3.2, 3.4, 3.6, 3.7, 4.1, 4.2