

# Syllabus

## STAT 4121-001 Mathematical Statistics I Fall 2025

**WF 11:00 am-12:20 pm at 60WCHARL 270**

**Instructor:** Dr. Xuan Cao, Associate Professor

**Office:** 5306 French Hall West

**E-mail:** [xuan.cao@uc.edu](mailto: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 purpose of these courses is to understand the theory of statistical inference using techniques, definitions, and concepts that are statistical and that are natural extensions and consequences of the statistical concepts. Specific topics include in Probability and Distributions, Multivariate Distributions, Some Special Statistical Distributions, Unbiasedness, Consistency, and Limiting Distributions and Central Limit Theorem. In this course students will develop transferable skills that will translate to many different career settings:

- Critical Thinking: Analyze complex issues and formulate insightful conclusions.
- Research and Creative Process: Generate insightful research questions and come up with innovative project designs.
- Quantitative Reasoning: Apply quantitative reasoning skills and accurately interpret findings.

**Prerequisites:** Have taken the following Courses MATH2063 min grade C-, MATH2076 min grade C-, STAT2037 min grade C-.

**Textbook:** Wackerly, Mendenhall, and Scheaffer. (2008). Mathematical Statistics with Applications, 7th Edition.

**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, 11 am to 12 pm**

**Midterm Exam 2: Wednesday, Oct 29, 11 am to 12 pm**

**Final Exam: Wednesday, Dec 10, 10:15 am–12:15 pm**

All tests (midterm/final exam) are closed-book. You are allowed to prepare one crib-sheet for each exam (8.5" 11" sheets of paper, **one-sided**, any content, but nothing photocopied).

- 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.

- 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.
- Two 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: 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: 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

**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.

**Attendance:** Starting this fall 2016, Title IV provisions will require that undergraduate students who wish to maintain their eligibility to receive federal financial aid show that they have participated in each course in which they have enrolled. To accomplish this, the University and A&S have developed a simple procedure that will be made available through Blackboard. When you access the sites for each of your courses, you will see a link at the top of the control panel at left entitled "**Attendance Verification.**" Clicking on this link will take you to a simple question: "What three actions will you take to succeed in this course?" By answering this question, you will have verified participation.

**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))

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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 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. **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](http://www.uc.edu/accessibility))

(<https://nam11.safelinks.protection.outlook.com/>)

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](mailto: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.

### Tentative Schedule (subject to change)

Week Beginning:	Topic	Reading Assignment
Aug 25	Statistics; Probability and the laws of probability; Random sampling	1.1-1.6; 2.1-2.12
Sep 1	Discrete random variables; Expected values of a random variable or a function of a random variable	3.1-3.3
Sep 8	Binomial probability distribution; Poisson probability distribution;	3.4, 3.8
Sep 15	Moment generating function; Continuous random variable;  Midterm 1 Review on September 15	3.9; 4.1-4.3
Sep 22	Midterm 1 on <b>September 24</b>  Special probability distributions	4.4-4.6

Sep 29	Other expected values; Multivariate probability distribution	4.9; 5.4, 5.8
Oct 6	Sampling distribution; The Central Limit Theorem (no class on Oct 10 Reading Day)	7.1-7.3
Oct 13	Estimation	8.1-8.3
Oct 20	Evaluating a point Estimator; Confidence interval Midterm 2 Review on October 24	8.4; 8.5-8.6
Oct 27	Midterm 2 on <b>October 29</b> Sample size; Confidence interval (continued)	8.7-8.9
Nov 3	Methods of Estimation	9.6-9.7
Nov 10	Hypotheses testing	10.1-10.3
Nov 17	Sample size; Confidence interval	10.4; 10.5
Nov 24	P-values; Small sample hypothesis testing on mean (No class on November 28 Thanksgiving Day weekend)	10.6-10.8
Dec 1	Final Exam Review	
Dec 8	<b>Final Exam Dec 10, 10:15 am-12:15 pm</b>	

