STAT 315: Statistics I (Calculus-based probability)
Fall 2025 Syllabus

Course Information

Prerequisites: Two semesters of single variable calculus (Math 131-132) or the equivalent, with a grade of "C" or better in Math 132. Math 233 is strongly recommended but not required; in particular, multivariable integration will be introduced/reviewed asynchronously mid-semester.

Description: This course concerns calculus-based probability theory, with an emphasis on probability theory necessary for application to and understanding of statistical inference. The course covers probability models, sample spaces, conditional probability, independence, random variables, expectation, variance, various discrete and continuous probability distributions, sampling distributions, the Central Limit Theorem and normal approximations.

Learning objectives: Develop a working knowledge of the basic concepts in probability (mean, variance, covariance, conditional probability, independence, Bayes theorem, etc.) as well as the basic probability models (the classical discrete and continuous random variables and their interpretation as modeling tools). Learn multivariate analysis. Understand and apply the law of large numbers and the central limit theorem.

Lecture Information

Section	Instructor	Time	Location
01	Westling	MW 2:30 – 3:45	LGRC A201
02	Rey-Bellet	MWF 12:20 – 1:10	LGRC A203
03	Saha	MWF 10:10 – 11:00	LGRC A203
04	Rey-Bellet	MWF 1:25 – 2:15	LGRC A201
05	Li	TTh 8:30 – 9:45	LGRC A201
06	Saha	MWF 8:00 – 8:50	LGRC A201

Instructor Information

Instructor	Email	Office	Office Hours
Ted Westling (chair)	twestling@umass.edu	LGRT 1338	TBA
Jialin Li	jialinli@umass.edu	LGRT 1423 J	TBA
Luc Rey-Bellet	lr7q@umass.edu	LGRT 1423 K	TBA
Abhisek Saha	abhiseksaha@umass.edu	LGRT 1435 K	TBA

You can expect instructors to respond to emails within one business day. For questions about course content, homework, or exams, please use Piazza. You will typically get a faster response on Piazza, and other students with the same question can benefit as well. You can ask questions anonymously if you prefer.

Course Materials

- **Required Textbook:** Wackerly, Mendenhall, and Schaeffer. *Mathematical Statistics with Applications, 7th Edition.* (ISBN-13: 978-0495110811). Abbreviated WMS. Homework problems will be assigned from the textbook, so make sure you have the right version.
- Some additional material will also be made available through the course Canvas site.
- Course discussion will be on Piazza. This is where you can ask clarifying questions about lecture, homework, or anything else. If you were enrolled in the class prior to the semester, you should have received an invitation to join the Piazza. If not, you can join the course Piazza here: **TBA**

Attendance Policy

Attendance to each lecture is required. Students are responsible for all material covered in each lecture.

Late/Make-up Work Policy

Homework turned in up to 48 hours after the deadline will receive up to 90% credit. This is a blanket extension that does not require approval and will be granted automatically for all work turned in on Canvas. Homework turned in more than 48 hours after the deadline will not receive any credit. Students who are absent due to university-approved extenuating circumstances remain responsible for meeting all class requirements and contacting their instructor in a timely fashion about making up missed work. Such students will be offered reasonable assistance in making up missed work. No homework extensions will be offered after the solutions have been posted.

Grade Weight and Course Requirements

- Homework: 25%
    - Weekly problem sets assigned from the course textbook will be posted to the course Canvas page. Solutions to the homework will be posted approximately one week after the due date.
    - Homework will be due on Thursdays at 11:59PM. No homework will be due the week of midterms.
    - Homework should be submitted to Canvas, and only Canvas submission will be graded.
    - Homework solutions must be handwritten unless you have a qualifying accommodation.
    - You must show all work to receive credit for a correct answer. The answer to a problem (correct or incorrect) with no work will receive no credit.
    - Partial or incorrect solutions will receive (generous) partial credit, so even if you do not know how to do a problem, you should do your best and write something down. The point of homework is to give you a chance to practice putting material from lecture and section into practice. Hence, what matters more than getting the answer correct is the process of doing the problem.
    - Unreadable work will not be graded.
    - You may work in groups of up to three students on homework problems, but you must write the solutions yourself. Identical or nearly identical solutions to homework problems will be treated as potential academic dishonesty.
    - The lowest homework grade will be dropped.
- Quizzes: 25%
    - There will be five short quizzes on Canvas. These quizzes will be open-book and open-notes and will focus on conceptual understanding of course material rather than mathematical calculation. After your first quiz attempt, you will be shown your total score. 24 hours after you complete your first attempt, you will be allowed to re-take the quiz, and the better of your two scores will be used.
- Midterms: 25%
    - There will be two evening midterm exams that are common to all sections.
    - The first midterm exam will be **Thursday, October 9, 7-9PM.**
    - The second midterm exam will be **Thursday, November 13, 7-9PM.**
    - The midterm exam that you do better on will count for 4/5 of your total midterm grade (20% of your final grade), and the midterm you do worse on will count for 1/5 of your total midterm grade (5% of your final grade).
- Final Exam: 25%
    - The final exam (at the university-assigned time during finals week) will be comprehensive. For both the midterm and final exams, you will be allowed to use one (back and front letter paper) "cheat sheet" of your own creation. No other outside materials will be allowed.

Grade Scale

Letter grades will be assigned based on the following ranges:

F	D	D+	C-	C	C+	B-	B	B+	A-	A
[0,50)	[50,55)	[55,60)	[60,65)	[65,70)	[70,75)	[75,80)	[80,85)	[85,89)	[89,93)	[93,100]

Small adjustments may be made to these cut-offs in the students' favor.

Course Schedule

Here is an approximate weekly course schedule. The date ranges were chosen so that M/W/F sections have three class sessions and M/W and T/Th sections have two class sessions per range, with two exceptions: Due to holidays, the T/Th section has an extra class in the 10/7 – 10/15 date range, and only has one class in the 11/7 – 11/13 date range.

Dates	**WMS Sections**	**Description**
9/2 – 9/8	2.1-2.4	Syllabus review, set notation, discrete sample spaces and events.
9/9 – 9/15	2.5-2.6	Discrete probability, combinatorics. **Quiz 1** (Canvas)
9/16 – 9/22	2.7-2.10	Conditional probability, independence, multiplicative and additive laws, law of total probability, Bayes' rule.
9/23 – 9/29	2.11, 3.1-3.5	Discrete random variables, expectation, binomial and geometric distributions. **Quiz 2** (Canvas)
9/30 – 10/6	3.6-3.8	Negative binomial, hypergeometric, and Poisson distributions.
10/7 – 10/15	4.1-4.4	Continuous random variables, expectation, and uniform distribution. No class Monday 10/13. T/Th sections have an extra session. **Midterm I** (Thursday 10/9 7-9 PM).
10/16 – 10/22	4.5-4.7,4.10	Normal, gamma and beta distributions, Tchebysheff's theorem.
10/23 – 10/29	5.1-5.4	Multivariate random variables, marginal and conditional distributions, independence. **Quiz 3** (Canvas)
10/30 – 11/6	5.5-5.8	Expected value, covariance, and properties. No class Tuesday 11/4
11/7 – 11/13	5.9-5.11	Multinomial and bivariate normal distributions, conditional expectation. No class Tuesday 11/11. T/Th has only one session. **Quiz 4** (Canvas).
11/14 – 11/20	6.1-6.4	Distribution of transformations of RVs, method of distributions, method of transformations. **Midterm II** (Thursday 11/13 7-9 PM)
11/21 – 12/2	3.9,6.5,6.7	Moment generating functions, method of MGFs, order statistics. No class Wed 11/26 – Fri 11/28.
12/3 – 12/9	7.1-7.3, 7.5	LLN, normal distribution, CLT, normal approximation to the binomial distribution. **Quiz 5** (Canvas)
Finals week		**Cumulative Final Exam**

Make-up Exam Policy

This policy is governed by UMass academic regulations: https://www.umass.edu/registrar/academic-regulations

Students are expected to take exams at the scheduled times. In excusable situations, including but not limited to the ones listed below, instructors are obligated to offer make-up exams. Students are responsible to inform the instructors as early as possible and to provide supporting documents when necessary.

1. Students absent due to extenuating circumstances: including jury duty, military obligations, scheduled activities for other classes, the death of a family member, or verifiable health-related incapacity.
2. Students absent due to religious reasons. Inform the instructor at the beginning of the semester.
3. Students absent due to athletic events, field trips, and performances.
4. Students absent due to health reasons. Note that if a student gets sick while taking an exam, the student is responsible for notifying the proctors immediately and the student will be taken to University Health Services. No make-up exam will be offered if the proctors were not notified.
5. Exam conflicts. It is the University's policy that students can not be expected to take two exams at the same time or three exams in one day. For conflicting exams, students should submit an exam conflict form through their SPIRE account for review and approval by the Registrar's Office. The Evening Exam Conflict and Final Exam Conflict forms are located in the Class & Finals Schedule section of the Manage Classes tile in SPIRE. The Registrar's Office will review students' exam schedule and notify students and instructors when a make-up exam is warranted based on the policy as outlined in the academic regulations. Students are required to submit the request at least 2 weeks before the scheduled exams.
6. Other circumstances: students are expected to inform the instructors as early as possible should issues arise beyond those discussed above. The students' instructor and course chair will evaluate the situation and inform the student of their decision. If the situation is not the fault of the student, then the instructors and course chairs are obligated to offer a make-up exam.

In scheduling a make-up exam, the instructors will inform the students at least three business days before the scheduled time of the time and location of the exam. The instructors and course chairs may use the department and CNS proctoring services for make-up exams when appropriate.

Generative AI policy

You **may not** use generative AI for homework or closed-book exams. You **may** use generative AI for open-book quizzes, though it is strongly discouraged.

University policies

University policies regarding Accommodations, Academic Honesty, and Title IX, apply to all courses. These policies can be found here:

https://www.umass.edu/senate/book/non-responsible-employee-required-syllabus-statements.