

**MATH/STAT 230/730, Section 4 and Section 5 – Syllabus**  
**Probability (Ling Zhou)**  
**Fall Term, 2024**

**Instructor:** Ling Zhou – Email: [ling.zhou@duke.edu](mailto:ling.zhou@duke.edu)

**TA:** Victor Amaya – Email: [victor.amaya@duke.edu](mailto:victor.amaya@duke.edu)

**Course Materials:**

1. The course text is Jim Pitman, *Probability*, Springer-Verlag, 1993. [Available for free online via Duke library.](#)
2. An additional resource is [Elementary probability for applications, by Rick Durrett](#), 2nd Edition, January 2018 (draft). Also available for free online via Duke Library.

**Course Description:** This is a calculus-based first course in the theory and applications of probability. It develops quantitative methods for solving problems that involve uncertainty and provides a foundation for the further study of statistics or random processes.

**Prerequisites:** Single variable calculus is a prerequisite for this course. Multivariable is not a prerequisite for the course, but double integrals will be used for constructing density functions and calculating probabilities.

**Class Times and Location:**

Section 4: TuTh 3:05-4:20pm in Social Sciences 119

Section 5: TuTh 4:40-5:55pm in Gray 228

**Class Notes and Lecture Recordings:**

Lecture notes will be uploaded to Canvas's 'Modules/Lecture Notes' folder.

- A 'blank' version will be uploaded before each class (at least one day ahead).
- The annotated version will be uploaded after class on the same lecture day by 10pm.

Lectures for the 4:40-5:55pm session will be recorded and uploaded to Canvas right after class.

**Course websites:**

The class website on Canvas will be the home base for this course. Canvas will be used for

- posting the Homework assignments weekly
- posting/sending announcements
- posting additional study resources

Homework sets will be collected through Gradescope, which will also be used to post/record grades.

**Learning resources:**

- [Probability help room.](#)
- [Ed discussion](#): Accessible through Canvas. The TA will be actively monitoring and responding to questions posted here.

- **Study groups:** Students are encouraged to work with each other on the Homework problems. The Academic Resource Center (ARC) offers services to help you connect with peers: [Study Connect](#) and [Peer tutoring](#).

**Office hours: (in construction)**

Monday	Tuesday	Wednesday	Thursday	Friday
		9:30-10:30am Tanya Brailovskaya Physics 274J	10:00-11:30am Ling Zhou Physics 208	
1:30-2:45pm Quanjun Lang Gross 359		1:00-2:30pm Quanjun Lang Gross 359		
				2:40-3:40pm Tanya Brailovskaya LSRC D243
				4:00-5:30pm Ling Zhou <a href="#">Zoom</a>
5-7pm Help room TA Physics 274J	5-7pm Help room TA Physics 274J	5-7pm Help room TA Physics 274J		

'\*' means the room is subject to change.

Please email me if you would like to schedule an appointment outside of office hours.

**Midterm and final exam dates:**

- Thursday, Sep 26 - Midterm 1
- Thursday, Oct 31 - Midterm 2
- The final exam is given at the official time as dictated by the registrar. Check the website below for time: <https://registrar.duke.edu/calendars-key-dates/exam-schedules>  
You must take your final exam with your section. Only your dean can excuse you from your scheduled final exam time. (*Section 4: Dec 15, 2-5pm. Section 5: Dec 11, 2-5pm*).

**Grading Policy:**

Grades in this course will be based on the assessment of **homework, 2 midterm exams, and a final exam**. The grade will count the assessments using the following proportions:

- 35% homework
- 20% each midterm exam (2)
- 25% final exam

Letter grades will be assigned as follows:

A+	Over 100		B+	[86.00–89.499]		C+	[71.50–74.999]		D	[50.00–59.999]
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A	[93.00–100.00)		B	[80.00–85.999)		C	[65.00–71.499)		F	Below 50
A-	[89.50–92.999)		B-	[75.00–79.999)		C-	[60.00–64.999)			

### Graduate Students:

For graduate-level students enrolled in 730, there will be a two-part additional assignment. **Part 1 is due 10/18 and part 2 is due 12/6.** See Canvas for additional details. These assignments will be weighted as 10% of the course grade. The remaining grade weights will be adjusted accordingly: homework 31.5%, each of two midterm exams 18%, and the final exam 22.5%.

This class continues through December 5th (the graduate reading period does not apply to this course).

### Homework Assignments:

- Homework will be assigned roughly weekly (at least one week before the due time) and due on **Fridays at 11:59 pm.**
  - Anyone who asks for a 24-hour homework extension for any reason will be granted one.
  - Students who submit all homework sets by the Friday deadline will receive a 2% bonus added to their overall homework average. If a student submits all except one homework set by the Friday deadline, they will receive a 1% bonus.
  - Homework submitted more than 24hrs late will be subject to a 5% per hour deduction.
- Submission Instructions:
  - Students should upload their scanned completed homework sets to Gradescope each week. Graders will grade homework, provide comments, and record scores via Gradescope. The graders will have many papers to grade, and it will help them significantly if you write clearly, rotate your images/scans so they are upright, and select pages/images properly.
  - You will lose points for homework that is hard to read. You will lose points for homework that is not properly labeled. You will lose points for homework that is not properly rotated. When you upload your work to Gradescope, please select the pages that correspond to each problem - you will lose points for work that is incorrectly selected.
- Students are encouraged to work with each other on the homework problems. Final answers should be written up independently: copying homework solutions - from a peer or any other source - is not allowed.
- Students are encouraged to ask for help on their homework (during office hours or by Ed Discussion). To make discussions more productive, students should attempt the problems before seeking help.
- Solutions should be complete arguments; the process by which one has arrived at the solution is far more important than a correct answer. Solutions should be logically complete and clearly written. When appropriate, complete sentences should be used to develop arguments.

### Midterm and Final Exams:

- There will be two midterm exams and one final exam.

- a. Because course material builds on itself, midterm exams are cumulative. However, the focus of each midterm exam is recent material that has not yet been assessed on previous midterm exams.
  - b. The final will be cumulative, and later material will be disproportionately overrepresented.
2. All exams (the two midterm exams and one final exam) will take place in class. Access to one 8.5x11 inch sheet of notes and a calculator will be allowed on all exams.
3. Students will be allowed to bring any calculator of their choice to the midterm/final - you may use a computer to access Wolfram Alpha, but you may not refer to notes/resources.
4. If a student is too ill to complete an assignment or attend a midterm exam, they should inform the instructor as soon as possible using the [Short Term Illness Form](#).
5. If a student must miss a midterm exam and is unable to complete a makeup exam **by the following Tuesday**, the weight of that midterm exam will move to the final exam.
6. Student work for midterm exams will be scored and returned through Gradescope.
7. If a student takes all two midterm exams, they may replace their lowest midterm exam grade with their final exam grade (if the final exam grade is higher). A student **must take all two midterm exams** in order to replace the lowest grade with their final exam grade.
8. **We will use the testing center for midterm exams and final exam accommodations. You are responsible for scheduling the test at least one week in advance.**

#### Testing Center:

This class will use the Testing Center to provide testing accommodations and temporary test-taking supports to undergraduates registered with and approved by the Student Disability Access Office (SDAO) and/or Academic Resource Center (ARC). The Testing Center operates by appointment only and appointments must be made at least 7 consecutive days in advance, but please schedule your appointments as far in advance as possible. You will not be able to make an appointment until you have submitted a Semester Request with the SDAO or completed screening at the ARC and your accommodations or supports have been approved. If you have not already done so, promptly submit a Semester Request to the SDAO or schedule your screening with the ARC in order to make your appointment in time.

- For instructions on how to register with SDAO, visit their website at <https://access.duke.edu/requests>.
- For instructions on how to schedule a screening with the ARC, visit their website at <https://arc.duke.edu/ld-adhd/overview>.
- For instructions on how to make an appointment at the Testing Center, visit their website at <https://testingcenter.duke.edu>.

#### Communication:

It is the student's responsibility to check their email daily (on weekdays) to get any important course updates, (for Outlook users, please check the "Other" folder, as announcements from Canvas sometimes get routed there). Log in periodically on Gradescope to make sure that exam and homework grades are recorded correctly; *any regrade requests should be submitted within one week of the time an assignment is returned.*

The instructor will plan to respond to emails within 2 business days. If a student has not received a response within that time frame, the student should send a follow-up email.

**Attendance:**

1. Students are encouraged to attend all classes. A student absent from class bears full responsibility for all subject matter and procedural information discussed in class.
2. Students who miss midterm exams or assignments due to a scheduled varsity athletic trip or religious holiday should submit an online [NOVAP](#) or [RHoliday](#) form, respectively, at least a week ahead of time and decide with the instructor how to make up the work.
3. Those with a personal emergency or bereavement should inform their academic dean and instructor. Please contact the instructor as soon as possible after returning to schedule make-up work.
4. [Community Standard](#) sanctions apply for abuse of this procedure.

**Academic Integrity:**

Academic dishonesty on midterm exams, plagiarism on homework and projects, copying homework, lying about an illness or absence and other forms of academic dishonesty are a breach of trust with classmates and faculty and will not be tolerated. They also violate Duke's [Community Standard](#) and will be referred to the Office of Student Conduct as described here in the [Academic Integrity Council](#). Additionally, there may be penalties for their final course grade.

**Tentative Schedule:** see [Math/Stat 230/730-Fall2024 Schedule](#) (for the most up-to-date schedule) or the table below.

Wk	Dates	Pitman Book Sections	Topics Tues	Topics Thurs	HW due Fridays
1	8/27, 8/29	1.1-1.4	probability interpretations, equally likely outcomes	notation, distributions, conditional probability, trees	
2	9/3, 9/5	1.5, 1.6	conditional probability, independence	independence, Bayes'	HW1
3	9/10, 9/12	2.1, 2.5, 3.1	Binomial distribution, sampling with/without replacement, random variables	random variables, joint distributions, marginal distributions	HW2
4	9/17, 9/19	3.1, 3.2	conditional distributions, independence, multinomial	expectation, indicator functions	HW3
5	9/24, 9/26	3.2, 3.3	variance and SD	Midterm 1, covers material from weeks 1-4	
6	10/1, 10/3	2.2, 3.3	normal distribution and normal approximation	law of large numbers, central limit theorem	HW4
7	10/8, 10/10	3.3, 3.4	central limit theorem, confidence intervals	confidence intervals, discrete distributions (geometric)	
8	10/15, 10/17	3.4, 3.5	Fall break	discrete distributions (negative binomial, Poisson)	HW5

9	10/22, 10/24	4.1, 4.5, 5.1	Poisson, continuous distributions: pdf, cdf	continuous distributions: mean, variance, uniform	HW6
10	10/29, 10/31	4.2	exponential, Poisson arrival process	Midterm 2, primarily material from weeks 5-9 but relies on prior material	
11	11/5, 11/7	4.2, 4.4	Poisson arrival process, gamma, change of variables	change of variables	HW7
12	11/12, 11/14	5.1, 5.2	joint distribution	joint distribution	HW8
13	11/19, 11/21	5.3, 6.1-6.2	independent normal, Rayleigh distribution	conditional distribution and expectation	HW9
14	11/26, 11/28		(Review)	Thanksgiving	
15	12/3, 12/5	6.3, 6.4	conditional	conditional, covariance/correlation (optional)	HW10
17	<b>Final exam.</b> Cumulative, but material from weeks 10-15 will be disproportionately overrepresented.				

**Note:** the syllabus and course schedule are subject to change. Any changes to the syllabus and/or course schedule will be relayed to the students through Canvas and/or email.