MA 2621 Probability for Applications Fall 2025 - A Term

1. **Contacts**

   Professor

   Ray Zirui Zhang
   Stratton Hall 410
   rzhang8@wpi.edu
   Office Hour: Mon, Tue, Thur 5-5:50pm and upon request via email

   Teaching Assistant
   Hammed A. Olayinka
   Salisbury Lab 405
   haolayinka@wpi.edu
   Office Hour: Tue 1-3:00pm

   Grader Xiaoyu Chen

2. **Class and discussion:**

Lecture:	AL01	Mon, Tue, Thu, Fri,	4:00–4:50pm,	Fuller Labs, UPH
Discussions:	AD01	Wed,	1:00–1:50pm,	Stratton Hall 301
	AD02	Wed,	2:00–2:50pm,	Stratton Hall 301
	AD04	Wed,	4:00–4:50pm,	Stratton Hall 301

   In the case of inclement weather, lectures might be moved to zoom.

3. **Grading**:

   The total score will be composed from the individual scores by using the following weighting:

   - 30% Homework
   - 30% Midterm
   - 40% Final

   The achievement of the following total score will be sufficient for the stated letter grades:

   - A 90%
   - B 80%
   - C 70%

   The instructor might adjust the threshold downwards.

   For borderline cases, the instructor may consider additional factors such as participation in class and discussion.

4. **Exams**

   - Midterm: Sept 12
   - Final: Oct 10

   The exam will be held in the regular class time and location. The exams are closed book, no calculator is allowed. For each exam, you are allowed to bring one formula sheet on **a letter size paper with hand written notes on both sides.**

5. **Homework**

   The problem sets will be posted on Canvas. Written homework problems will be submitted via Gradescope, as **single .pdf file per homework** (there are many free apps that allow to scan work on paper on a phone into a single pdf document, if you need help with this please ask).

   - The homework submission has not only to contain the result, but **carefully developed calculations and proofs that can actually be followed by a reader**. If you provide only results and no reasoning how you get them, you will not receive any points on written homework assignments.
   - Whereas the discussion of homework problems in (small) groups is not only okay but encouraged, **the final write-up has to be done individually**. Any copying of homework is a violation of the academic honesty policy (see below) and will be treated as such.
   - For Gradescope submission, you must **assign the correct pages or page regions to each problem**. **Points will be deducted if problems are not correctly assigned to their corresponding pages**. If you are not sure how to do this, please review this Gradescope guide or ask the TA or professor for help in advance.

6. **Late submission & makeup policy**:

   - The **lowest** of the homework grades will be dropped in final grade calculation.
   - Late assignments without prior consent of the professor will not be accepted and will receive a grade of zero. Extensions will be granted only in the event of emergencies or extenuating situations that you discuss with the professor in advance.
   - Make-up for the midterm and final exams will only be allowed for medical reasons or in the event of emergencies or a WPI formal activity that is brought to my attention at the beginning of the course.

7. **Textbooks** (recommended):
   No book is required for the class, class material is available for download on Canvas. For those who want to have a little bit a deeper look (and in particular more exercises), I recommend the following two books

Rick Durrett, *Elementary Probability for Applications*. Cambridge University Press, 2009. ISBN 978-0-521-86756-6
A draft for the (upcoming) third edition available at
https://services.math.duke.edu/~rtd/EP4A/EP4A_April2021.pdf

Matthew A. Carlton, **Jay L. Devore**, *Probability with Applications in Engineering, Science, and Technology*. Second Edition. Springer, 2017. ISBN 978-3-319-52400-9
Available for free via the Gordon Library https://link-springer-com.ezpv7-web-p-u01.wpi.edu/book/10.1007/978-3-319-52401-6

8. **Polleverywhere**

   Polleverywhere will be used for in-class polls. You can access it via PollEv.com/rayziruizhang167PollEv.com/rayziruizhang167. You will need to register with your WPI email address.

9. **Echo360**

   The lectures will live-streamed via Echo360. The recordings will be available on Canvas after the class.

10. **Resources**:

    - The learning management system for the course is Canvas, https://canvas.wpi.edu/courses/78176. Homework, lecture notes and videos will be posted there.
    - A discussion forum will be hosted on piazza. The forum supports different formatting options, and in particular the inclusion of mathematical symbols via LaTeX. See https://piazza.com/help/formatting.html for the general formatting guidelines and https://en.wikibooks.org/wiki/LaTeX/Mathematics#Symbols for a list of commands for specific symbols. While discussions (also about homework) are encouraged, please refrain from giving complete solutions of homework questions. Providing hints is okay, an entire solution is *dishonest* and will be treated as violation of the academic honesty policy. Instructors will endorse correct student answers and provide only answers if there is no student answer given in reasonable time. Feel free to ignore the requests for contributions on piazza!
    - The Academic Resources Center (ARC) offers individual tutoring and Math and Science Help (MASH, group drop-in tutoring) in person on the 5th floor of Unity Hall for undergraduate students. Some MASH sessions that occur after 6pm may take place in the Exam Proctoring Center (EPC, UH 505). Tutoring sessions are 50 minutes long and are facilitated by peer undergraduate students. Tutoring availability is dependent on tutor's schedules within the ARC hours of operation. Students should use Tutortrac to sign up for 1-on-1 tutoring appointments that fit their schedule. Students are encouraged to schedule 1-on-1 appointments in advance. No appointments are needed for MASH group drop-in sessions.

      A Term 2025 tutoring will start on Sunday August 24, 2025 and will end on Wednesday October 8, 2025. There will be NO tutoring in A term on: September

1, 2025; September 19, 2025. Information about MASH and tutoring offered by the ARC is located on the Academic Resources Center Canvas Page and on the Academic Resources Center WPI Webpage.

11. **Help**:
You have not only the possibility to ask for help, you are encouraged to do so. However, it is expected that you invest a major effort in your work and you provide an explanation about what you have done and tried so far. Sources for help:

- Discussion session
- Discussions with peers
- Online discussions on piazza
- Office hours by the professor (best for fundamental questions about the material learned)
- Office hours by the TA (best for questions concerning homework problems)
- Math Tutoring Center
- ARC/MASH Peer Tutoring

Please post your questions on piazza. In this way not only you, but all your classmates can learn from your questions, so this is beneficial for everybody. (If you have personal questions, of course please reach out to instructors per email.)

12. **Course description** as per course catalog:

This course is designed to introduce the student to probability. Topics to be covered are: basic probability theory including Bayes theorem; discrete and continuous random variables; special distributions including the Bernoulli, Binomial, Geometric, Poisson, Uniform, Normal, Exponential, Chi-square, Gamma, Weibull, and Beta distributions; multivariate distributions; conditional and marginal distributions; independence; expectation; transformations of univariate random variables.

Recommended background: Multivariable Differential and Integral Calculus (MA 1024, or equivalent). We will extensively use material from Calculus III and IV in this class.

Note: This course is designed primarily for students interested in applications and not major in in the Mathematical Sciences department. Mathematical Sciences and Actuarial Mathematics majors and those interested in the deeper mathematical issues underlying probability theory are encouraged to take MA 2631 Probability Theory instead. Undergraduate credit may not be earned both for this course and for MA 2631 Probability Theory.

13. **Preliminary course outline**

Topic 1: Rules of Probability, Combinatorial Probability
Topic 2: Independence
Topic 3: Discrete random variables & their distributions
Topic 4: Continuous random variables & their distributions

Topic 5: Joint distributions
Topic 6: Limit theorems
Topic 7: Conditional Probability and Markov Chains – tentative, if time permits

14. **Electric Recordings**: If you wish to record any meeting (from class to office hour), you will have to ask all participants for permission and can do so only if permission is granted. All recordings are for strictly for personal use only and any distribution is not permitted.

15. **Students with Accessibility Needs**

    Students with approved academic accommodations should plan to submit their accommodation letters through the Office of Accessibility Services Student Portal. Should you have any questions about how accommodations can be implemented in this particular course, please contact us as soon as possible. Students who are not currently registered with the Office of Accessibility Services (OAS) but who would like to find out more information regarding requesting accommodations and what that entails should plan to contact them via email: AccessibilityServices@wpi.edu, by phone (508) 831-4908, or by stopping by the office on the 5th floor of Unity Hall.

16. **Academic Honesty**

    Each student is expected to be familiar with WPI's Academic Honesty policies. All acts of fabrication, plagiarism, cheating, and facilitation will be prosecuted according to the university's policy. If you are ever unsure as to whether your intended actions are considered academically honest or not, please contact your instructor in advance.

17. **Further Resources**

    Even the best of learners need help along the way. WPI has some great resources to support you in this class and beyond. Here are some to check out:

    - Academic Resource Center, https://www.wpi.edu/student-experience/resources/academic-resources-center
    - IT Service & Support, https://www.wpi.edu/offices/services-support
    - Student Development and Counseling Center, https://www.wpi.edu/offices/student-development-counseling-center
    - Accessibility Services, https://www.wpi.edu/offices/office-accessibility-services
    - Health Services, https://www.wpi.edu/student-experience/health-counseling/health-services
    - Office of Diversity, Inclusion, and Multicultural Education (ODIME), https://www.wpi.edu/offices/diversity
    - International House, https://www.wpi.edu/offices/international-house

Enjoy the Course!