

# MATH-UA.233 Theory of Probability (Fall 2021)

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Office hours: Monday, 5PM - 7PM and Wednesday, 9 AM - 11 AM (WWH 1307 or online).

## Tentative Schedule

Week	Dates	Topics	Textbook
1	9/2	Sample spaces, combinatorics	1.1–1.4
2	9/7, 9/9	More combinatorics, probability spaces, events	1.5, 2.1–2.5
3	9/14, 9/16	Conditional probability, independence	3.1–3.5
4	9/21, 9/23	Discrete probability distributions	4.2, 4.6–4.8
5	9/28, 9/30	Continuous probability distributions	5.1, 5.3–5.6
6	10/5, 10/7	Random variables, cumulative distribution functions	4.1, 4.10
7	<b>10/14</b>	<b>Midterm exam I</b>	
8	10/19, 10/21	Transformation rule, expectation and variance	5.7, 4.3–4.5, 4.9, 5.2
9	10/26, 10/28	Joint distributions	6.1, 6.7
10	11/2, 11/4	Independence & operations with random variables	6.2–6.3, 6.6
11	11/9, 11/11	More on expectation, covariance, correlation	7.1–7.4
12	<b>11/16, 11/18</b>	<b>Midterm exam II</b> , conditional distributions	6.4–6.5
13	11/23	Conditional expectation, generating functions	7.5–7.7
14	11/30, 12/2	Stochastic convergence, the law of large numbers	8.2, 8.4
15	12/7, 12/9	Weak convergence, the CLT, Poisson process	8.3, 9.1
16	12/14	Markov chains (overview)	9.2
	<b>12/xx</b>	<b>Final Exam</b>	—

## Time and Location

Tuesdays and Thursdays 11:00 AM–12:15 PM, Kimmel Center 914 Silver (KIMM 914. Classes will be recorded and made available to participants. Attendance is not mandatory.

## NYU LMS (Brightspace)

The primary means of communication for this course will be the NYU LMS (Brightspace) site of the course. Students are expected to check this for assignments, lecture notes, and announcements.

## Prerequisites

MATH-UA 123 Calculus III or MATH-UA 213 Math for Economics III (for Economics majors) with a grade of C or better and/or the equivalent, and MATH-UA 140 with a grade of C or better and/or the equivalent. Not open to students who have taken MATH-UA 235 Probability and Statistics.

*Note:* This course is intended for math majors and other students with a strong interest in mathematics. It requires fluency in topics such as multi-variable integration and therefore a grade of B or better in MATH-UA 123 or MATH-UA 213 (or the equivalent) is strongly recommended.

## Textbook references

- **Course textbook:** *A First Course in Probability, 10th ed.* by S. Ross, Pearson (2018).

*Note:* Your course is participating in the *Follett Access program*. This is an NYU Bookstore initiative that delivers required course materials at the lowest possible price.

The book, *A First Course in Probability, 10th ed.* by S. Ross will be delivered to you digitally through the Brytewave platform. The cost of the book is 27.75 USD, which will be added as a “book charge” to your bursar bill, this is a savings of 172.25 USD over the publisher’s list price.

If you decide not to use this digital edition you can opt-out of the program. The deadline for opting out is **September 17th, 2021**. If you do not opt out by this date you will be charged. The link to opt out of the program is: <https://includedcp.follett.com/2015>.

It is **not** mandatory to work with the textbook for following the course. All relevant material (lecture notes, assignments) will be available through the NYU LMS (Brightspace) course homepage.

- **Other useful references:** *Probability and Statistics* by M. H. DeGroot and M. J. Schervish, Addison-Wesley (2010),  
*Stochastics: Introduction to Probability and Statistics, 2nd ed.* by H.-O. Georgii, De Gruyter (2012),  
*An Introduction to Probabilistic Modeling* by P. Brémaud, Springer (1988).  
*Elementary Probability for Applications* by R. Durrett, Cambridge University Press (2009).

## Homework assignments

- Assigned weekly, except for weeks with a midterm or final exam
- Posted online on Tuesdays, on NYU LMS (Brightspace).
- Due on Thursdays of the following week, to be submitted until 1PM.  
10 % penalty if assignment is submitted after Thursday, 1PM but before Friday at 1PM.

An assignment will not be graded if it is submitted after Friday at 1PM. An assignment that is not graded will be given a 0 score. Your two lowest scores will be dropped in the calculation of your written homework grade.

## Written exams

There will be two midterm exams and one final exam. The details for the parameters of each exam can be found on the NYU LMS (Brightspace) site.

**Midterm Exam I: 10/14, 11:00 AM – 12:15 PM, in-class, closed-book**

**Midterm Exam II: 11/16, 11:00 AM – 12:15 PM, in-class, closed-book**

**Final Exam: TBD, in-class, closed-book**

## Grading

Homework	20%
Midterm exam with lower score	15%
Midterm exam with higher score	25%
Final exam	40%

## Recitations

Recitations will take place every Friday 11:00AM–12:15PM, starting 09/10/2021. A teaching assistant will lead class discussions on the course material and homework problems, and be there to answer your questions.

**Teaching Assistant:** Eric Thoma, CIMS. (Session: Friday, 11:00AM–12:15PM, Kimmel Center 914 Silver (KIMM 914)).

### **Policy on out-of-sequence exams**

We are only able to accommodate a limited number of out-of-sequence exams. For this reason, we may approve out-of-sequence exams in the following cases:

- A documented medical excuse.
- A University sponsored event such as an athletic tournament, a play, or a musical performance.  
Athletic practices and rehearsals do not fall into this category. Please have your coach, conductor, or other faculty advisor contact your instructor.
- A religious holiday.
- Extreme hardship such as a family emergency.

We will not be able to accommodate out-of-sequence exams and finals for purposes of more convenient travel, including already purchased tickets. Please note again the date of the final and plan your winter travel accordingly.

Scheduled out-of-sequence exams (those not arising from emergencies) must be taken before the actual exam. Makeups must occur within one week of the regularly scheduled exam otherwise a zero score will be given.

If you require additional accommodations as determined by the Center for Student Disabilities, please let your instructor know as soon as possible.

### **Academic Honesty**

Guidelines regarding cheating and plagiarism are laid out in the College of Arts and Sciences guidelines and will be adhered to strictly. **Collaboration is permitted, in fact encouraged, for home assignments;** however, all submitted assignments must be written up independently and represent the student's own work and understanding. Furthermore, **collaborations must be acknowledged** at the top of the assignment, by naming the participants in it.