

# MATH-UA 233-001: Theory of Probability

Fall 2017      Miranda Holmes-Cerfon      Meeting Time: Mon., Wed., 2-3:15pm      Warren Weaver Hall 101

Registrar's syllabus: An introduction to the mathematical treatment of random phenomena occurring in the natural, physical, and social sciences. Axioms of mathematical probability, combinatorial analysis, binomial distribution, Poisson and normal approximation, random variables and probability distributions, generating functions, the Central Limit Theorem and Laws of Large Numbers.

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.

*Note: a grade of B or higher is recommended; students with a grade of C should consider taking "Probability and Statistics" instead, an easier course.*

## Teaching Staff and Logistics

Instructor:	Miranda Holmes-Cerfon	E-mail: <a href="mailto:holmes@cims.nyu.edu">holmes@cims.nyu.edu</a>
		Tel: 212.998.3262
Office Hours:	Tuesday TBD	Office: WWH 1107
TA:	TBD	TBD
Website:	<a href="http://piazza.com/nyu/fall2018/mathua233001/home">piazza.com/nyu/fall2018/mathua233001/home</a>	

## Course goals

This is an undergraduate course on probability theory for mathematics majors. The goals are: (i) to learn the key mathematical concepts in probability theory, such as probability spaces, random variables, mean, variance, conditional expectation, joint distributions, law of large numbers, central limit theorem, and markov chains; (ii) to become familiar with important distributions, such as binomial, poisson, normal, exponential, etc.; (iii) to be able to interpret, set up and solve problems involving uncertainty. The course will emphasize both the mathematical foundations as well as how to solve specific problems. It will also be appropriate for students in non-math majors who need to use probability theory in their work/studies, but want a more rigorous foundation.

## Textbook

The textbook for the course is *Probability with Applications and R* by Robert P. Dobrow, available at the bookstore. You can find other introductory probability textbooks in the library.

Each week, readings will be assigned from the textbook, and posted on the website. You are encouraged to read these *before* coming to class.

## Recitations

You are each registered for a recitation. This is an opportunity to practice solving more problems, and to go over solutions to the homework problems. You are strongly encouraged to attend each recitation.

## Homework

Homework is due every **Wednesday at 2pm** and will be based on the previous week's lectures. Late homework will not be accepted. Homework is considered late if it received after the end of class. *The only way to hand in homework is to bring it to class.* If you cannot attend the class, you must find someone else to hand it in for you. In particular, homework left in a mailbox *will not be accepted.* (You can also hand it in to the instructor in person, but appointments will not be made for this.) The lowest *two* homework grades will be dropped.

The homework is meant to help you practice working with key concepts and to give you a chance to practice *neatly* and *clearly* writing up your solutions. Learning math requires solving many more problems than will be assigned on the homework. You are strongly encouraged to seek out other problems; for example the textbook has lots of examples, both with and without solutions.

The percentage assigned to homework overall is nominal but you need to do the homework in order to keep up with the material. Math is something that must be learned gradually and consistently, and if you fall behind, it is hard to catch up. Exams will be strongly based on homework questions.

## Collaboration

You are strongly encouraged to work with others – for example to solve homework problems or to prepare for exams. However, you must make sure to *write up your own* homework solutions, and to *acknowledge* those you worked with. Submitting two very similar sets of solutions is a violation of academic integrity and will be disciplined by the university. The best way to ensure this doesn't happen is to write your solutions separately.

## Communication

The Piazza website (<https://piazza.com/nyu/fall2018/mathua233001/home>) will be used to communicate information about the course, and to communicate between students in the course. You will all have access to the course page, and you will be able to post messages either privately to the instructor, or publicly so that everyone can see.

If you have questions about the homework, or a general question about the lecture material, please **post this publicly**. This way everyone in the class will benefit from the answer as it is likely that several people have a similar question. Mistakes/typos on the homework problems will also be posted here.

If you see a question for which you know or have an idea about the answer, please do **post to respond** – another goal of the Piazza is to generate discussion, as there may be several different (yet equally valuable) interpretations of the course material. The instructor will monitor the posts frequently and indicate whether they are correct. Even if they aren't, it's ok! It's much better to have an incorrect idea and find out soon, than to keep thinking the incorrect idea and make mistakes on the test, or further along in your career.

The NYU Classes website will be used to post grades, via Gradebook.

## Exams

Midterm 1	Tuesday, October 9 (in class)
Midterm 2	Monday, November 12 (in class)
Final Exam	Monday December 17, 2-3:50pm

## Grades

Grades will be calculated using the following weights:

Final Exam	40%
Homework	10%
Midterm 1	25%
Midterm 2	25%

There is no standard conversion from your final percentage to your final letter grade, but the instructor will give an idea after each exam of the rough letter grade it corresponds to.