

MATH-UA.0235 Probability and Statistics (Spring 2021)

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Office hours: Thursdays, 5:30 PM–7:30 PM and Fridays 7:30 AM–9:30 AM, or upon request.

Tentative Schedule

Week	Dates	Topics
1	1/28	Probability spaces, events
2	2/2, 2/4	Elementary combinatorics, conditional probability, stochastic independence
3	2/9, 2/11	Discrete distributions, statistical tests and Neyman-Pearson Lemma
4	2/16, 2/18	Continuous distributions, random variables
5	2/23, 2/25	Expectation, variance, higher moments of random variables
6	3/2 , 3/4	Midterm exam 1 , Joint distribution of random variables
7	3/9, 3/11	Covariance, correlation, independence of random variables
8	3/16, 3/18	Poisson process
9	3/23, 3/25	Stochastic convergence and the (weak) law of large numbers
10	3/30, 4/1	Normal distributions, χ^2 - and t -distribution, Z -test and t -test
11	4/6, 4/8	Weak convergence and central limit theorem, application to tests
12	4/13 , 4/15	Midterm exam 2 , estimators
13	4/20, 4/22	Maximum-Likelihood estimators, Cramér-Rao inequality
14	4/27, 4/29	Conditional distributions and conditional expectations
15	5/4, 5/6	Regression analysis, linear model, confidence intervals
	TBD	Final Exam

Time

Tuesday and Thursday, 9:30–10:45AM. The course will be held online via *Zoom* (see the NYU Classes page). Meetings will be recorded and made available to participants. Attendance is not mandatory.

NYU Classes

The primary means of communication for this course will be the NYU Classes site, accessed through home.nyu.edu. Students are expected to check this for assignments, lecture notes, and announcements.

Prerequisites

MATH-UA 122 Calculus II or MATH-UA 212 Math for Economics II (for Economics majors) with a grade of C or better and/or the equivalent. Not open to students who have taken MATH-UA 233 Theory of Probability and/or MATH-UA 234 Mathematical Statistics.

Textbook references

- **Course textbook:** *A Modern Introduction to Probability and Statistics: Understanding Why and How* by F. M. Dekking, C. Kraaikamp, H. P. Lopuhaä, and L. E. Meester, Springer (2005).
- **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),
Introduction to Probability Models, 12th ed. by S. M. Ross, Elsevier (2019).

Homework assignments

- Assigned weekly, except for weeks with a midterm or final exam
- Handed out on Tuesdays, on NYU Classes
- 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 Classes site.

Midterm Exam I : Tuesday, March 2nd, Take-home exam

Midterm Exam II : Tuesday, April 13th, Take-home exam

Final Exam: TBD

Grading

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

Recitations

Recitations will take place online every Friday 9:30–10:45AM and 11:00AM–12:15PM (two groups). A teaching assistant will lead class discussions on the course material and homework problems, and be there to answer your questions.

Teaching Assistants: Luca Venturi, CIMS, E-Mail address: lv800@nyu.edu (11:00AM–12:15PM); Ziyi Xie, CIMS, E-Mail address: zx1153@nyu.edu (9:30–10:45AM)

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.