MATH 8a: Introduction to Probability and Statistics Summer 2025

Instructor: Tudor Popescu

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Modality & Meetings:

This section will meet in person on Tuesdays, Wednesdays, and Thursdays from 1:50 pm to 4:20 pm in Goldsmith 117. There will also be office hours, which we will set together during the first week of class.

Course Description:

Discrete probability spaces, random variables, expectation, variance, approximation by the normal curve, sample mean and variance, and confidence intervals. Working knowledge of high school algebra and graphing functions is required.

Text:

Understandable Statistics, 12th Edition, by Brase & Brase The textbook is available through the Brandeis Library, the Brandeis Bookstore, or other online retailers.

Software and Calculators:

We will use Microsoft Excel for this class. Please download Microsoft Excel by going to <u>https://www.microsoft.com/en-us/education/products/office</u> and following the instructions using your Brandeis email. You will also be allowed to use a basic four-function calculator as needed on homework, quizzes, and tests. You may not use your phone as a calculator.

Moodle & Gradescope:

All course materials (i.e. class recordings, notes, homework assignments, etc.) for Math 8a will be available online on Moodle. Log in at <u>http://moodle.brandeis.edu</u> using your Unet username and password. We will also use Gradescope for assignments.

Grading:

Category	Weight	Description
Attendance & Participation	15%	
Homework	20%	
Quizzes	20%	June 5, 12, and 26; during class
Midterm Exam	20%	June 19; during class
Final Exam	25%	TBA

Attendance:

Attendance for this class is **mandatory**. This is a fast-paced class, and even one missed day could result in falling behind. Attendance will be taken at the start of each class, and excessive tardiness or absences could negatively impact your grade.

Four-Credit Course:

Success in this 4 credit hour course is based on the expectation that students will spend a **minimum of 25 hours of study time per week** in preparation for class (readings, homework, preparation for exams, etc.).

Meeting Outside of Class:

If you would like to meet outside of class (for example, to discuss your grade, to go over a homework question, etc.), please send me an email at <u>tudorpopescu@brandeis.edu</u> and we can find a convenient time. There will also be a designated time in class to ask questions.

Academic Accomodations:

Brandeis seeks to welcome and include all students. If you are a student who needs accommodations as outlined in an accommodations letter, please talk with me and present your letter of accommodation as soon as you can. I want to support you.

In order to provide test or quiz accommodations, I need the letter more than 48 hours in advance. I want to provide your accommodations, but cannot do so retroactively. If you have questions about documenting a disability or requesting accommodations, please contact Student Accessibility Support (SAS) at access@brandeis.edu

Academic Integrity:

You are expected to follow the University's policy on academic integrity, which is distributed annually as section 4 of the Rights and Responsibilities Handbook. Instances of alleged dishonesty will be forwarded to the Department of Student Development and Conduct for possible referral to the Student Judicial System. Potential sanctions include failure in the course and suspension from the University. If you have any questions about how these policies apply to your conduct in this course, please ask.

Available Resources:

Many resources are available to help with the academic and non-academic factors that contribute to student success (finances, health, food supply, housing, mental health counseling, academic advising, physical and social activities, etc.). Please explore the links on the Support at Brandeis page <u>https://www.brandeis.edu/support/undergraduate-students/index.html</u> to find out more about the resources that the University provides to help you and your classmates achieve success.

Timely communication:

Use your Brandeis email to reach out to me. I am usually able to respond quickly to most messages, within 24 hours, although during the weekends it could take me a bit longer. If I reach out to you, with a query or comment or in response to an email from you, I would appreciate it if you would acknowledge receipt of my message and/or respond with 24 hours, unless it is during the weekend. Note that we will use your Brandeis email address, so you need to check it regularly.

All course announcements can be found in the <u>Course News & Announcements</u> page on Moodle.

Topics:

Some topics may be added or omitted as time permits.

Chapter 1 Getting Started

- 1.1 What Is Statistics?
- 1.2 Random Samples
- 1.3 Introduction to Experimental Design

Chapter 2 Organizing Data

- 2.1 Frequency Distributions, Histograms, and Related Topics
- 2.2 Bar Graphs, Circle Graphs, and Time-Series Graphs
- 2.3 Stem-and-Leaf Displays

Chapter 3 Averages and Variation

- 3.1 Measures of Central Tendency: Mode, Median, and Mean
- 3.2 Measures of Variation
- 3.3 Percentiles and Box-and-Whisker Plots

Chapter 4 Elementary Probability Theory

- 4.1 What Is Probability?
- 4.2 Some Probability Rules Compound Events
- 4.3 Trees and Counting Techniques

Chapter 5 The Binomial Probability Distribution and Related Topics

- 5.1 Introduction to Random Variables and Probability Distributions
- 5.2 Binomial Probabilities
- 5.3 Additional Properties of the Binomial Distribution
- 5.4 The Geometric and Poisson Probability Distributions

Chapter 6 Normal Curves and Sampling Distributions

- 6.1 Graphs of Normal Probability Distributions
- 6.2 Standard Units and Areas Under the Standard Normal Distribution
- 6.3 Areas Under Any Normal Curve
- 6.5 The Central Limit Theorem
- 6.6 Normal Approximation to Binomial Distribution

Chapter 7 Estimation

- 7.1 Estimating μ When σ is Known
- 7.2 Estimating μ When σ is Unknown
- 7.3 Estimating p in the Binomial Distribution
- 10.3 Chi-Square Distributions

Chapter 8 Hypothesis Testing

- 8.1 Introduction to Statistical Tests
- 8.2 Testing the Mean μ
- 8.3 Testing a Proportion p
- 8.4 Tests Involving Paired Differences (Dependent Samples)
- 8.5 Testing $\mu_1 \mu_2$ and $p_1 p_2$ (Independent Samples)

Chapter 9 Correlation and Regression

- 9.1 Scatter Diagrams and Linear Correlation
- 9.2 Linear Regression and the Coefficient of Determination
- 9.3 Inferences for Correlation and Regression

Chapter 10 Chi-Square and F Distributions

- 10.1 Chi-Square: Tests of Independence and Homogeneity
- 10.2 Chi-Square: Goodness of Fit

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