JOHN JAY COLLEGE OF CRIMINAL JUSTICE
THE CITY UNIVERSITY OF NEW YORK
524 W 59th Street, New York, NY, 10019

Syllabus

George Mitchell | gmitchell@jjay.cuny.edu | New Building 6.65.22 | Mathematics & Computer Science

COURSE INFORMATION

Course Title and Section: MAT301 – 01, Probability and Statistics I

Course Dates: 01/25/2025 - 05/22/2025

Location and Schedule: Tuesday and Thursday, 3.05pm-4.20pm, New Building L2.79

Office Hours: Tuesdays, 1.45pm-2.45pm, 6.65.22 NB. Or by appointment.

Course Description: This course emphasizes the probability theory necessary for the study of statistical inference. Topics include pictorial and tabular results of descriptive statistics, an introduction to probability theory, independence and conditional probabilities including Bayes' Theorem. Several discrete (binomial, hypergeometric, negative binomial, Poisson) and continuous (Normal, exponential, gamma, uniform) probability distributions will be studied including the concepts of a distribution function, probability mass and density functions, expected value, variance, and standard deviation. Joint probability distributions and sampling distribution follow. We shall see how the law of large numbers and the Central Limit Theorem are used in statistics. The course will then apply the concepts of probability learned to the point estimates, confidence intervals, tests of hypothesis, and regression. Students will use computer software R. In fact, learning how to use R is a major course objective.

Required Text and Course Materials: *No required text. Course lecture notes will be provided.*

Learning Outcomes: Upon completion of the course, students will be able to:

- Choose an appropriate probability or statistical model for a particular problem.
- Know what conditions are typically required for the use of probability and statistical models and be able to assess whether those conditions are reasonably met.
- Interpret calculated solutions of probability models.
- Make appropriate inferences using the chosen statistical models.
- Use the R software system to handle datasets, display a dataset graphically, and to do probability computations, statistical analyses, and computer simulations.

Course Prerequisites: ENG201 and MAT151 or MAT241.

GRADING

Exams: There will be *two* in-class exams and a *final exam*.

Homework: There will be *five* homework assignments, posted online on Brightspace. Students will have one week to complete the assignment and upload their submission to Brightspace.

Extra Credit: An extra credit assignment will be posted during the course once we have covered sufficient material.

A breakdown of how the homework and exams will affect your grade is below:

Grade Breakdown	% of Final Grade
Homework	30%
Exam I	20%
Exam II	20%
Final Exam	30%

If you have any questions about how you calculate your grade, please contact the instructor!

The Final Grade Scale is below:

Grade		Grade	% of points
A	93.0- 100%	C	73.0- 77.0%
A-	90.0%- 92.9%	C-	70.0 – 72.9%
B+	87.1 – 89.9%	D+	67.1 – 69.9%
B	83.0- 87.0%	D	63.0- 67.0%
B-	80.0- 82.9	D-	60.0 – 62.9%
C+	77.1 – 79.9	F	Below 60%

POLICIES AND ACCOMMODATIONS

Americans with Disabilities Act (ADA) – CUNY Accommodations Policy: Students who believe that they may need an accommodation due to a disability are encouraged to immediately contact the Office of Accessibility Services (OAS) in Room L.66 NB (212-237-8031) or accessibilityservices@jjay.cuny.edu. Students are welcome but not required to speak with the instructor privately to discuss specific needs for the class. Students with disabilities are entitled to confidentiality over disability-related status or details. Students are not required to disclose their specific disability to their instructors or anyone else.

Policy on Religious Accommodations: Students requesting religious accommodations should contact the Office of the Dean of Students at deanofstudents@jjay.cuny.edu. The Dean's office will work with you and the instructor to find an acceptable accommodation. Reasonable accommodations may include, but are

not limited to, permission to make up a test or lecture, time and/or space to pray, or an accommodation relating to appearance or dress.

CUNY Policy on Academic Integrity: Academic dishonesty is prohibited in CUNY. It includes, among other things: *cheating* (e.g. unauthorized use of an electronic device during an exam); *obtaining unfair advantage* (e.g. circulating or gaining access to exam materials) and *plagiarism* (e.g. presenting or submitting someone else's work as one's own, including information on the internet). Plagiarism may be intentional or unintentional, but lack of dishonest intent does not absolve a student of responsibility for plagiarism.

It is the student's responsibility to recognize the difference between statements that are common knowledge (which do not require documentation) and restatements of the ideas of others. Paraphrase, summary, and direct quotation are acceptable forms of restatement, as long as the source is cited. If in doubt, it is better to include a citation.

Students who are unsure how and when to provide documentation are advised to consult with the instructor. The Library has free guides designed to help students with problems of documentation at http://guides.lib.jjay.cuny.edu/citing_sources.

John Jay's Artificial Intelligence responsible use guidelines can be found here: https://www.jjay.cuny.edu/academic-policies-and-guidelines.

Incomplete Grade Policy: Current undergraduate INC policy can be found here: http://jjay.smartcatalogiq.com/current/undergraduate-bulletin/academic-standards-and-policies/grades/.

Attendance: Class attendance is the student's responsibility. Lateness, excessive absences, or lack of participation will adversely affect a student's grade.

Make-Up Exams: When a student must miss an exam due to some educational activities such as a field trip or due to some other acceptable reason, the student must inform the instructor *before* the day of the exam and arrange for a time to take the exam. Make-up exams will be taken *before* the scheduled exam date unless there are exceptional circumstances.

WELLNESS AND STUDENT RESOURCES

Wellness Center: Students experiencing any personal, medical, financial or familial distress, which may impede their ability to fulfill the requirements of this course, are encouraged to visit the Wellness Center (L.65 NB). Available resources include Counseling Services, Health Services, Food Bank, and Emergency Funding support. See https://new.jjay.cuny.edu/student-life/wellness-center.

Academic Resources and Services: Visit the Students' Academic Resources and Services website for a list of student academic support resources: https://new.jjay.cuny.edu/academics/academic-resources-services.

Resources for Reporting Discrimination, Sexual Harassment, Stalking or Domestic Partner Violence: The individuals below are available to discuss your rights and the resources available to you as well as help you explore your options for reporting sexual misconduct, harassment or discrimination of any kind. You may report incidents that occur on or off campus, including incidents that occur online, or on messaging and social media platforms to:

1. Gabriela Leal, Title IX Coordinator, 646-557-4674, gleal@jjay.cuny.edu
2. Diego Redondo, Director of Public Safety & Risk Management, 212-237-8524, dredondo@jjay.cuny.edu
3. Danielle Officer, Interim Dean of Students, 212-237-8211, deanofstudents@jjay.cuny.edu

To speak confidentially, you may contact the Women's Center Counselor and Gender-Based Violence Prevention and Response Advocate, Jessica Greenfield at jgreenfield@jjay.cuny.edu. For more information and resources, please see CUNY's Policy on Sexual Misconduct (PSM), CUNY's Equal Opportunity and Non-Discrimination Policy, or see this page: https://new.jjay.cuny.edu/about-us/compliance-diversity/non-discrimination-equal-opportunity/training-resources.

COURSE SCHEDULE AND OUTLINE

Please see https://www.jjay.cuny.edu/sites/default/files/2024-10/Spring-2025-Academic-Calendar.pdf for the Spring 2025 academic calendar. Outline below refers to the Lecture Notes.

CLASS	DATE	OUTLINE	HOMEWORK
1	Tues Jan 28th	1. Introduction	-
2	Thurs Jan 30th	2. Describing and Visualizing Data	-
3	Tues Feb 4th	3.1. Probability and Interpretations 3.2. A Primer on Set Theory 3.3. Axioms of Probability	-
4	Thurs Feb 6th	3.4 Equally Likely Outcomes and Counting Methods	-
5	Tues Feb 11th	3.5 Conditional Probability and Bayes' Theorem 3.6. Random Variables	Homework 1 Assigned
6	Thurs Feb 13th	4.1 Probability Mass Functions 4.2 Expected Values and Variance	-
7	Thurs Feb 20th	4.3 Binomial Probability Distribution 4.4 Negative Binomial Distribution 4.5 Hypergeometric Distribution	Homework 1 Due
8	Tues Feb 25th	4.5 Hypergeometric Distribution Cont'd 4.6 Poisson Distribution	-
9	Thurs Feb 27th	5.1 Probability Density Functions 5.2 Expected Values and Variance	-

10	Tues March 4th	5.3 The Normal Distribution	Homework 2 Assigned
11	Tues March 11th	5.4. Exponential and Gamma Distributions 5.5. Beta Distribution 5.6 Other Notable Distributions	Homework 2 Due
12	Thurs March 13th	EXAM 1 (Covers Lectures 1-10)	-
13	Tues March 18th	6.1 Joint Distributions 6.2 Expected Values and Conditionals	Homework 3 Assigned
14	Thurs March 20th	6.3 Covariance and Correlation	-
15	Tues March 25th	7.1 Sampling Distributions	Homework 3 Due
16	Thurs March 27th	7.2 Sample Mean and Total 7.3 The Central Limit Theorem	-
17	Tues April 1st	8.1 Point Estimation – Method of Moments	-
18	Thurs April 3rd	8.1 Point Estimation – Maximum Likelihood Estimator	-
19	Tues April 8th	8.2 Bias and Variance of Estimators	Homework 4 Assigned
20	Thurs April 10th	8.3 Interval Estimation 8.4 Confidence Intervals for Means	-
21	Tues April 22nd	8.4 Confidence Intervals for Means Cont'd	Homework 4 Due
22	Thurs April 24th	8.5 Confidence Intervals for Proportions	-
23	Tues April 29th	9.1 Philosophy and Practice of Hypothesis Testing 9.2 One-Sample Tests for Population Mean	-
24	Thurs May 1st	EXAM 2 (Covers Lectures 11-22)	-
25	Tues May 6th	9.3 One-Sample Tests for Population Proportion	Homework 5 Assigned
26	Thurs May 8th	9.4 Errors in Hypothesis Testing	-
27	Tues May 13th	9.5 Power and Sensitivity Analysis	-
28	Thurs May 15th	Final Review	Homework 5 Due
29	May 16th–22nd	FINAL EXAMINATION	-

Note: We do not meet every Tuesday and Thursday, as the college is closed or has a different schedule.