

**BRONX COMMUNITY COLLEGE**  
**of the City University of New York**  
**DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE**

**SYLLABUS**

**MTH 23.5: PROBABILITY AND STATISTICS WITH ALGEBRA** (3 credits / 5 hours)

**Prerequisite:** None. Students with Math Proficiency Index less than 40 are strongly encouraged to enroll in Math Start or CUNY Start before taking college-level mathematics courses.

**Textbooks:** 1. Brase & Brase, Understanding Basic Statistics, 8<sup>th</sup> ed., Cengage Learning  
ISBN: 9781337558075

2. A. McInerney, MTH 5 Lecture Notes available at

<https://fsw01.bcc.cuny.edu/mathdepartment/Courses/Math/MTH05/05text0916b-hyper.pdf>

**Calculator:** Scientific calculator (suggested: TI-36X Pro)

**Course Description:** This is a probability and statistics course with elementary algebra topics integrated to support the statistics. Probability and statistics topics include organization and presentation of data, measures of central tendency and variation, correlation and linear regression, elementary probability, the binomial and normal distributions, sampling distributions, the central limit theorem, confidence intervals, student's t-distribution, and hypothesis tests. Elementary algebra topics include fractions, percent, adding and subtracting polynomials, linear and quadratic equations, literal equations, solving word problems, inequalities, and functions. This course is equivalent to MTH 23 in academic content and for the purposes of transfer and grade replacement.

**Purpose:** This course covers the full content of MTH 23 Probability and Statistics with supplemental instruction in elementary algebra for students who are not Math Proficient by CUNY standards. This course is not for STEM or Business Administration AS majors and is not a prerequisite for any higher-level mathematics course.

**Student Learning Objectives:** Upon completion of this course, students will be able to:

1. Perform operations with signed numbers using a calculator. Solve and graph linear equations. Solve literal equations and linear inequalities. Evaluate algebraic expressions and solve word problems. Evaluate functions and graph linear functions.
2. Sort, analyze and present numerical data using sample spaces, measures of central tendency, and measures of variation.
3. Recognize correlations between data sets using scatter diagrams; express linear correlations using least squares regression; determine the strength of the correlation via the correlation coefficient.
4. Predict experimental outcomes using basic techniques of probability (permutations, combinations, counting techniques, tree diagrams).
5. Recognize the features of a binomial experiment and apply the binomial probability distribution.
6. Recognize the features of a normal distribution and compute probabilities using the standard normal distribution.
7. Infer population parameters using sampling distributions and the Central Limit Theorem.
8. Limit the error of estimation by calculating confidence intervals.
9. Accept or reject a hypothesis by establishing a level of significance.

**Pathways:** This course satisfies CUNY Pathways Required Core Area B (Mathematical and Quantitative Reasoning).

**Grading Guidelines:**

|                      |     |
|----------------------|-----|
| Homework:            | 15% |
| Class participation: | 10% |
| Quizzes or tests:    | 20% |
| Midterm:             | 25% |
| Final Exam:          | 30% |

Additional details will be provided by your instructor.

**Course Activities:**

- **Homework:** Problem sets from the text will be given weekly to reinforce the material.
- **Class Participation:** Active participation is listening, speaking, and completing group and individual work in each class session.
- **Quizzes:** Short quizzes will be given every other week at the beginning of class. Quiz dates will be announced in class.
- **Midterm:** The midterm exam will be given during class and will be completed individually. No make-up tests will be given unless prior arrangements are made and the reason for the absence was unavoidable.
- **Final Exam:** The MTH 23.5 final is a cumulative, two-hour, uniform final exam given during the final exam period.

**Academic Integrity:** Academic dishonesty (such as plagiarism and cheating) is prohibited at Bronx Community College and is punishable by penalties, including failing grades, dismissal, and expulsion. For additional information and the full policy on Academic Integrity, please consult the BCC College Catalog.

**Accommodations/Disabilities:** Bronx Community College respects and welcomes students of all backgrounds and abilities. In the event you encounter any barrier(s) to full participation in this course due to the impact of a disability, please contact the disAbility Services Office as soon as possible this semester. The disAbility Services specialists will meet with you to discuss the barriers you are experiencing and explain the eligibility process for establishing academic accommodations for this course. You can reach the disAbility Services Office at: [disability.services@bcc.cuny.edu](mailto:disability.services@bcc.cuny.edu), Loew Hall, Room 211, (718) 289-5874. You may also reach DisAbility Services through Microsoft Teams. Download the Teams app, login using your CUNYfirst login, and join the DSO Student Service Center team using the access code: neewu66.

**If you test positive for COVID while taking an in-person/hybrid course:**

- Using your BCC email account, please email all your **in-person and/or hybrid** professors of your status.
  - Please include your emplid # and current phone number in your email.
  - Please also email us at [healthservices@bcc.cuny.edu](mailto:healthservices@bcc.cuny.edu) .
  - Your professor will work with you to complete class work while you are in quarantine.
- You will be called by a Health Services staffer. It is critical that you connect in a timely matter with this staff member for contact tracing information.
- You will need to submit a negative COVID test to Health Services ([healthservices@bcc.cuny.edu](mailto:healthservices@bcc.cuny.edu)) before you are allowed access to the campus.

Your negative test result must come from your doctor or a medical provider (e.g. CityMD, Urgent Care, etc.). We will **not** accept a negative home test result.

**Topics in Probability and Statistics with Algebra:** Section numbers preceding topics refer to Brase & Brase (for probability and statistics) and McInerney (for elementary algebra).

(\* indicates optional topics; leave some out as needed in order to do tests and review)

|         | PROBABILITY AND STATISTICS  | ELEMENTARY ALGEBRA   |
|---------|---|--|
| Week 1  | 1.1 What is statistics?   | 1, 2, 3.1 Review: arithmetic of signed numbers, fractions, decimals, percent, rounding, and order of operations                      |
|         | 1.2 Random Samples  | Calculators: Arithmetic and order of operations  |
| Week 2  | 1.3 Introduction to Experimental Design   | 3.2, 3.3, 3.4 Evaluating algebraic expressions and translating algebraic expressions   |
|         | 2.1 Frequency Distributions, Histograms, and Related Topics                             | Supplement: Area of a rectangle  |
| Week 3  | 2.2 Bar Graphs, Circle Graphs, and Time-Series Graphs*                                  | 8.2 Radicals   |
|         | 2.3 Stem-and-Leaf Displays*<br>3.1 Measures of Central Tendency: Mode, Median, and Mean | Calculators: Descriptive statistics  |
| Week 4  | 3.2 Measures of Variation   | 6.2 Combining like terms, adding and subtracting polynomials   |
|         | 3.3 Percentiles and Box-and-Whisker Plots*  | 4.1, 4.2, 4.3 Solving linear equations and applications to word problems   |
| Week 5  | 4.1 Scatter Diagrams and Linear Correlation   | 5.1, 5.2 Co-ordinate system, graphs of linear equations, slope of a straight line, equation of a line                                |
|         | 4.2 Linear Regression and the Coefficient of Determination*                             |  |
| Week 6  | 5.1 What is Probability?  |  |
|         | 5.2 Some Probability Rules– Compound Events<br><b>Midterm Review</b>                    | 4.3 Solving literal equations  |
| Week 7  | <b>Midterm</b><br>5.3 Trees and Counting Techniques*                                    | 6.3 Exponents and properties   |
|         | 6.1 Introduction to Random Variables and Probability Distributions                      | 3.3 Functions and their graphs   |
| Week 8  | 6.2 Binomial Probabilities  |  |
|         | 6.3 Additional Properties of the Binomial Distribution                                  |  |
| Week 9  | 7.1 Graphs of Normal Probability Distribution   | 4.4 Inequalities and interval notation, graphing linear inequalities on a number line  |
|         | 7.2 Standard Units and Areas Under the Standard Normal Distribution                     | Supplement: Area under the graph of a function, basic properties of area   |
| Week 10 | 7.3 Areas Under any Normal Curve  |  |
|         | 7.4 Sampling Distributions  |  |
| Week 11 | 7.5 The Central Limit Theorem   |  |
|         | 7.6 Normal Approximation to the Binomial Distribution                                   |  |
| Week 12 | 8.1 Estimating $\mu$ when $\sigma$ is Known   | 4.4 Solving linear inequalities  |
|         | 8.2 Estimating $\mu$ when $\sigma$ is Unknown   |  |
| Week 13 | 8.3 Estimating $p$ in the Binomial Distribution*  | 9.3, 9.4, 9.5 Solving quadratic equations by basic factoring and quadratic formula, with applications to more advanced word problems |
|         | 9.1 Introduction to Statistical Tests<br>9.2 Testing the Mean $\mu$                     |  |
| Week 14 | 9.3 Testing a Proportion $p^*$  |  |
|         | <b>Final Review</b>   |  |