Bronx Community College of the City University of New York
Department of Mathematics and Computer Science

Syllabus: **MTH 23 Probability and Statistics** (3 credits, 3 hours per week)

Prerequisite: MTH 05 or equivalent; co-requisite ENG 02 and/or RDL 02 if required

TEXT: Understanding Basic Statistics by Brase & Brase, BROOKS/COLE, Cengage Learning. (6th Edition, ISBN 978-1-111-82702-1)

Learning Objectives: On successful completion of this course, students will be able to

1. Sort, analyze and present numerical data using sample spaces, measures of central tendency, measures of variation, and measures of dispersion.
2. 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.
3. Predict experimental outcomes using basic techniques of probability (permutations, combinations, counting techniques, tree diagrams).
4. Recognize the features of a binomial experiment and apply the binomial probability distribution.
5. Recognize the features of a normal distribution and compute probabilities using the standard normal distribution.
6. Infer population parameters using sampling distributions and the Central Limit Theorem.
7. Limit the error of estimation by calculating confidence intervals.
8. Accept or reject a hypothesis by establishing a level of significance.

This course addresses the following **General Education Proficiencies**: analysis, interpretation, evaluation, and integration of information to formulate and solve problems; use of mathematical and scientific methods to formulate and solve problems and to understand the physical, natural and social worlds. This course may be used to satisfy **Category A** (Mathematical and Quantitative Reasoning) of the CUNY **Pathways Required Core.**

Topics, Text Sections and Homework: (*optional topics)

	SECTION	TOPIC	PAGES	PROBLEMS
1. Getting Started	1.1	What is statistics?	10-12	1-15
	1.2	Random Samples	18-20	1-16
	1.3	Introduction to Experimental Design	28-29	1-9
2. Organizing Data	2.1	Frequency Distributions, Histograms, and Related Topics	50-54	1-16
	2.2*	Bar Graphs, Circle Graphs, and Time-Series Graphs	60-63	1-14
	2.3*	Stem-and-Leaf Displays	67-70	1-9

3. Averages and Variation	3.1	Measures of Central Tendency: Mode, Median, and Mean	89-93	1-24
	3.2	Measures of Variation	104-110	1-21
	3.3	Percentiles and Box-and-Whisker Plots*	117-119	1-11
4. Correlation and Regression	4.1	Scatter Diagrams and Linear Correlation	144-147	1-18
	4.2*	Linear Regression and the Coefficient of Determination	160-165	1-18
5. Elementary Probability Theory	5.1	What is Probability?	183-186	1-18
	5.2	Some Probability Rules– Compound Events	199-204	1-29
	5.3*	Tree Diagrams and Counting Techniques	212-214	1-27
6. The Binomial Probability Distribution and Related Topics	6.1	Introduction to Random Variables and Probability Distributions	230-234	1-16
	6.2	Binomial Probabilities	243-248	1-27
	6.3	Additional Properties of the Binomial Distribution	253-256	1-20
7. Normal Curves and Sampling Distributions	7.1	Graphs of Normal Probability Distribution	273-276	1-11
	7.2	Standard Units and Areas Under the Standard Normal Distribution	284-286	1-50
	7.3	Areas Under any Normal Curve	296-300	1-30
	7.4	Sampling Distributions	305	1-9
	7.5	The Central Limit Theorem	312-316	1-20
	7.6	Normal Approximation to the Binomial Distribution	322-325	1-21
8. Estimation	8.1	Estimating μ when σ is Known	346-350	1-25
	8.2	Estimating μ when σ is Unknown	357-362	1-22
	8.3*	Estimating p in the Binomial Distribution	370-374	1-27
9. Hypothesis Testing	9.1	Introduction to Statistical Tests	399-403	1-24
	9.2	Testing the Mean μ	414-419	1-24
	9.3*	Testing a Proportion p	425-429	1-24

Suggested Grading Guidelines: Homework, quizzes, oral presentations, projects, etc. (1/3 of grade); In-class tests (1/3 of grade); Final Exam (1/3 of grade).

SLF 4/09/ AW 3/10/ RG 5/12 KD 3/15