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

SYLLABUS for MTH 21.5 – A Mathematical World with Algebra (3 credits, meets 5 hours per week)

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.
Co-requisite: None.

Textbooks: 1. "Mathematics, A Practical Odyssey" by D. Johnson and T. Mowry, 8th edition
                 Cengage Learning, 2015. ISBN: 9781305104174
              2. "MTH 5 Lecture Notes" by A. McInerney, available at
   https://fsw01.bcc.cuny.edu/mathdepartment/Courses/Math/MTH05/05text0916b-hyper.pdf
              3. "Arithmetic: A Textbook for Math 01" by A. Weaver, available at
   https://fsw01.bcc.cuny.edu/mathdepartment/Courses/Math/MTH01/ArithBook5thEd.pdf

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

Course Description: This course aims to introduce liberal arts students to the important mathematical concepts of sets, numbers, probability, statistics, and geometry. Students will learn how to analyze quantitative information, and how to make inferences and predictions about events around us. Further topics covered include financial management and linear programming. The following material from elementary algebra has been integrated into the course to provide the necessary background: fractions, decimals, percentages, radicals, functions, polynomials, linear and quadratic equations, literal equations, systems of equations, inequalities in one and two variables. This course is equivalent to MTH 21 A Mathematical World in academic content and for the purposes of transfer and grade replacement.

Purpose: This course covers the full content of MTH 21, A Mathematical World, 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.

This course is a **Pathways Core B (Mathematical and Quantitative Reasoning) Course**:
This course meets the following learning outcomes. A student will:

a) Interpret and draw appropriate inferences from quantitative representations, such as formulas, graphs, or tables.
b) Use algebraic, numerical, graphical, or statistical methods to draw accurate conclusions and solve mathematical problems.
c) Represent quantitative problems expressed in natural language in a suitable mathematical format.
d) Effectively communicate quantitative analysis or solutions to mathematical problems in written or oral form.
e) Evaluate solutions to problems for reasonableness using a variety of means, including informed estimation.
f) Apply mathematical methods to problems in other fields of study.

Student Learning Objectives (SLOs): Upon completion of this course, students will be able to:
1. Perform operations with signed numbers and fractions. Solve and graph linear equations. Solve literal equations. Evaluate algebraic expressions and solve word problems. Evaluate functions and graph linear functions. (a, b)
2. Use the language of sets (membership, union, intersection and complement) to analyze and solve problems. (a, b, c, f)
3. Sort, analyze and present numerical data using sample spaces and measures of central tendency. (a, b, f)
4. Recognize the families of prime, composite and perfect numbers. (b, c, d, f)
5. Predict experimental outcomes using basic techniques of probability (permutations, combinations, counting techniques, tree diagrams). (b, c, d, e, f)
6. Manage personal finances through a basic understanding of financial instruments such as loans, mortgages, and annuities. (b, c, d, e, f)
7. Understand the geometric concepts of perimeter and area and recognize fractals. (a, b, c, f)
8. Solve systems of linear equations and linear inequalities in two variables. (a, b)
9. Optimize a function subject to constraints using the methods of linear programming. (a, b, c, d, e, f)

Pathways: This course may be used to satisfy Category B (Mathematical and Quantitative Reasoning) of the CUNY Pathways Required Core.

Week 1	**Elementary Algebra Lecture Notes**	**Homework**
	• 1.1 – 1.8 Review of fractions	Exercises p. 14 1-6, p. 16 1-6
	• Chapters 1 – 4 in textbook 3: Arithmetic	
	Review decimals, rounding, percentages	Exercises from sections 4.1-4.4, 4.11
	• 2.1 – 2.6 Signed numbers, exponents, square roots 1-5	Exercises p. 28 1-15, p. 31 1-6, p. 32
	• 3.1 Order of operations	Exercises p. 39 1-8

Week 2	**Elementary Algebra Lecture Notes**	
	• 3.2 – 3.3 Algebraic expressions	Exercises p. 43 1-10
	• 3.4 – 3.5 Translating algebraic expressions	Exercises p. 46 1-8
	• 4.1 Algebraic statements and solutions	Exercises p. 55 1-15 (odd)
	• 4.2 Solving linear equations in one variable	Exercises p. 67 1-15 (odd)

Week 3	**Mathematics, A Practical Odyssey**	**Homework**
	• 2.1 Sets and set operations	Exercises 1, 7, 9, 17-25 (odd), 29, 41-49 (odd)
	• 2.2 Applications of Venn diagrams	Exercises 1, 3, 5, 27-31 (odd)
	• 2.3 Introduction to Combinatorics	Exercises 1, 5, 15, 17, 23-35 (odd)

Week 4	**Mathematics, A Practical Odyssey**	
	• 2.4 Permutations and combinations	Exercises 1, 3, 5, 13, 15, 19-37 (odd), 49, 53
	• 2.5 Infinite sets	Exercises 1, 3, 5, 11, 15, 17

Week 5	**Mathematics, A Practical Odyssey**	
	• 4.1 Population, sample and data	Exercises 1, 5, 7, 15, 23, 27
	• 4.2 Measures of central tendency	Exercises 1, 11, 15, 17, 19, 21
	• Supplement: percentiles	

Week 6	**Elementary Algebra Lecture Notes**	
	• 6.1 Introduction to polynomials	Exercises p. 143 1-8
	• 6.2 Adding and subtracting polynomials	Exercises p. 148 1-7
	• 6.3 Properties of exponents	Exercises p. 155 1-8
	Midterm Exam Review	

Week 7	**Midterm Exam**	
	Elementary Algebra Lecture Notes	
	• 8.1 Quadratic equations, number systems	
	• 8.2 Radical expressions	Exercises p. 209 1-15
	• 4.3 Solving literal equations	Exercises p. 71 1-5

Week 8	**Mathematics, A Practical Odyssey**	
	• 7.4 Prime numbers and perfect numbers	Exercises 3, 5, 9, 13, 15, 17
	• 7.5 Fibonacci numbers, the golden ratio	Exercises 1, 3, 5, 9, 11 (if discussed in class)
	Elementary Algebra Lecture Notes	
	• 4.4 – 4.5 Linear inequalities in 1 variable	Exercises p. 82 1-6

Week 9	**Mathematics, A Practical Odyssey**	
	• 3.1 History of probability	Exercises 1-8 (some of these hands on exercises may be done in class)
	• 3.2 Basic terms of probability	Exercises 1-28
	• 3.3 Basic rules of probability	Exercises 11-25 (odd), 47-53 (odd)

Week 10	**Mathematics, A Practical Odyssey**	
	• 3.4 Combinatorics and probability	Exercises 1-13 (odd), 21
	• 5.1 Simple interest	Exercises 5-19 (odd), 37
	• 5.2 Compound interest	Exercises 1-19 (odd), 29, 31, 35

Week 11	**Mathematics, A Practical Odyssey**	
	• 5.3 Annuities	Exercises 1, 3, 5, 9, 19
	• 5.4 Amortized loans	Exercises 1-9 (odd)
	• 8.1 Perimeter and area	Exercises 1-23 (odd)

Week 12	**Mathematics, A Practical Odyssey**	**Homework**
	• 8.9 Fractal geometry	Exercises 1, 3, 23, 27, 29
	Elementary Algebra Lecture Notes	
	• 5.1 Linear equations in two variables	Exercises p. 94 1-8
	• 5.2 Slope and the geometry of lines	Exercises p. 114 1-11

Week 13	**Elementary Algebra Lecture Notes**	
	• 5.3 Linear inequalities in two variables	Exercises p. 124 1-6
	• 5.4 – 5.5 Systems of linear equations	Exercises p. 135 1-8

Week 14	**Mathematics, A Practical Odyssey**	
	• 12.0 Review of linear inequalities	Exercises 1-19 (odd)
	• 12.1 Linear programming	Exercises 1-11 (odd)
	Final Exam Review	

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, Loew Hall, Room 211, (718) 289-5874.