

KINGSBOROUGH COMMUNITY COLLEGE
The City University of New York

CURRICULUM TRANSMITTAL COVER PAGE

Department: Math and Computer Science

Date: 02/05/2019

Title Of Course/Degree/Concentration/Certificate: Algebra for STEM Majors (MAT 09A0)

Change(s) Initiated: (Please check)

- | | |
|---|---|
| <input type="checkbox"/> Closing of Degree | <input type="checkbox"/> Change in Degree or Certificate |
| <input type="checkbox"/> Closing of Certificate | <input type="checkbox"/> Change in Degree: Adding Concentration |
| <input type="checkbox"/> New Certificate Proposal | <input type="checkbox"/> Change in Degree: Deleting Concentration |
| <input type="checkbox"/> New Degree Proposal | <input type="checkbox"/> Change in Prerequisite, Corequisite, and/or Pre/Co-requisite |
| <input checked="" type="checkbox"/> New Course | <input type="checkbox"/> Change in Course Designation |
| <input type="checkbox"/> New 82 Course (Pilot Course) | <input type="checkbox"/> Change in Course Description |
| <input type="checkbox"/> Deletion of Course(s) | <input type="checkbox"/> Change in Course Title, Number, Credits and/or Hours |
| | <input type="checkbox"/> Change in Academic Policy |
| | <input checked="" type="checkbox"/> Pathways Submission: |
| | <input type="checkbox"/> Life and Physical Science |
| | <input checked="" type="checkbox"/> Math and Quantitative Reasoning |
| | <input type="checkbox"/> A. World Cultures and Global Issues |
| | <input type="checkbox"/> B. U.S. Experience in its Diversity |
| | <input type="checkbox"/> C. Creative Expression |
| | <input type="checkbox"/> D. Individual and Society |
| | <input checked="" type="checkbox"/> E. Scientific World |
- Change in Program Learning Outcomes
- Other (please describe): _____

PLEASE ATTACH MATERIAL TO ILLUSTRATE AND EXPLAIN ALL CHANGES

DEPARTMENTAL ACTION

Action by Department and/or Departmental Committee, if required:

Date Approved: _____ Signature, Committee Chairperson: _____

If submitted Curriculum Action affects another Department, signature of the affected Department(s) is required:

Date Approved: 2/13/19 *I am aware of this submission*
Signature, Department Chairperson: _____

Date Approved: 2/13/19 Signature, Department Chairperson: Mary E. Dan

I have reviewed the attached material/proposal

Signature, Department Chairperson: Rma Yank



TO: Spring 2019 Curriculum Committee

FROM: Department of Mathematics & Computer Science

DATE: 02/05/2019

RE: New Course: Algebra for STEM Majors (MAT 09A0)

The Department of Mathematics & Computer Science is proposing to add an option for one requirement for the A.S. Mathematics degree, A.S. Computer Science degree, A.A.S. Computer Information Systems and other courses of study - which require MAT 900, in the following manner:

ADD:
MAT 09A0- Algebra for STEM Majors

Rationale for New Course: Allowing for the option of taking MAT 9A0, which will enable students to complete elementary and intermediate algebra in a single semester.

**KINGSBOROUGH COMMUNITY COLLEGE
THE CITY UNIVERSITY OF NEW YORK**

NEW COURSE PROPOSAL FORM

1. **DEPARTMENT, COURSE NUMBER, AND TITLE (SPEAK TO ACADEMIC SCHEDULING FOR NEW COURSE NUMBER ASSIGNMENT):**

Department of Mathematics & Computer Science,
MAT 09A0 - Algebra for STEM Majors

2. **DOES THIS COURSE MEET A GENERAL EDUCATION/CUNY CORE CATEGORY?**

- Life and Physical Science
- Math and Quantitative Reasoning
- A. World Cultures and Global Issues
- B. U.S. Experience in its Diversity
- C. Creative Expression
- D. Individual and Society
- E. Scientific World

IF YES, COMPLETE AND SUBMIT WITH THIS PROPOSAL A CUNY COMMON CORE SUBMISSION FORM. (Please see attachments.)

3. **DESCRIBE HOW THIS COURSE TRANSFERS (REQUIRED FOR A.S. DEGREE COURSE). IF A.A.S. DEGREE COURSE AND DOES NOT TRANSFER, JUSTIFY ROLE OF COURSE, E.G. DESCRIBE OTHER LEARNING OBJECTIVES MET:**

Preliminary indications are that students will receive transfer credit for:

CUNY Pathways course fulfilling the Required Core, Mathematical and Quantitative Reasoning requirement.

CUNY Pathways course fulfilling the Flexible Core, Scientific World requirement.

4. **BULLETIN DESCRIPTION OF COURSE:** A comprehensive treatment of the following: real numbers, absolute value, integer and rational exponents, polynomial operations, factoring techniques, roots and radicals, linear and quadratic equations, graphing techniques, systems of linear equations, Gaussian elimination. Introduces the study of functions in preparation for the study of pre-calculus and calculus.

Students who have completed MAT 900 will not receive credit for this course.

This course is appropriate for STEM majors.

5. CREDITS AND HOURS* (PLEASE CHECK ONE APPROPRIATE BOX BELOW BASED ON CREDITS):

1-credit:	<input type="checkbox"/> 1 hour lecture <input type="checkbox"/> 2 hours lab/field/gym
2-credits:	<input type="checkbox"/> 2 hours lecture <input type="checkbox"/> 1 hour lecture, 2 hours lab/field <input type="checkbox"/> 4 hours lab/field
3-credits:	<input type="checkbox"/> 3 hours lecture <input checked="" type="checkbox"/> 3 Credits 6 Lecture Hours, 2 Lab Hours <input type="checkbox"/> 2 hours lecture, 2 hours lab/field <input type="checkbox"/> 1 hour lecture, 4 hours lab/field <input type="checkbox"/> 6 hours lab/field
4-credits:	<input type="checkbox"/> 4 hours lecture <input type="checkbox"/> 3 hours lecture, 2 hours lab/field <input type="checkbox"/> 2 hours lecture, 4 hours lab/field <input type="checkbox"/> 1 hour lecture, 6 hours lab/field <input type="checkbox"/> 8 hours lab/field
More than 4-credits:	<input type="checkbox"/> Number of credits: ____ (explain mix lecture/lab below) ____ Lecture ____ Lab Explanation: Course emphasizes basic quantitative reasoning skills as well as develops the necessary mathematical background in order to master these skills, hence the extended hours.

***Hours are hours per week in a typical 12-week semester**

6. NUMBER OF EQUATED CREDITS IN ITEM #5: _____

7. COURSE PREREQUISITES AND COREQUISITES (IF NONE PLEASE INDICATE FOR EACH)

A. PREREQUISITE(S):

Prerequisite(s): For students who are eligible for a corequisite course per CUNY Math placement guidelines and likely to benefit from some developmental support, eligibility determined as follows: (1) Score of 40-56 on the Elementary Algebra portion of the ACCUPLACER CUNY Assessment Test in Math, or (2) passed MAT M100, or (3) passed a Kingsborough workshop culminating in passing the Departmental MAT M100 final exam, or (4) Appropriate corequisite designation.

B. COREQUISITE(S): N/A

C. PRE/COREQUISITE(S): N/A

8. BRIEF RATIONALE TO JUSTIFY PROPOSED COURSE TO INCLUDE:

A. ENROLLMENT SUMMARY IF PREVIOUSLY OFFERED AS AN 82 (INCLUDE COMPLETE 4-DIGIT 82 COURSE NUMBER)

B. PROJECTED ENROLLMENT: 84 -112 students.

C. SUGGESTED CLASS LIMITS: 28 students

D. FREQUENCY COURSE IS LIKELY TO BE OFFERED: Course will be offered every semester

E. ROLE OF COURSE IN DEPARTMENT'S CURRICULUM AND COLLEGE'S MISSION

Mathematics 09A0 is designed to provide students with an understanding of algebraic concepts, and skill and practice in the manipulation and utilization of these concepts.

Such a background is essential for later mastery of a wide variety of courses in mathematics, computer studies, the sciences, and other areas.

9. LIST COURSE(S), IF ANY, TO BE WITHDRAWN WHEN COURSE IS ADOPTED (NOTE THIS IS NOT THE SAME AS DELETING A COURSE): N/A

10. IF COURSE IS AN INTERNSHIP, INDEPENDENT STUDY, OR THE LIKE, PROVIDE AN EXPLANATION AS TO HOW THE STUDENT WILL EARN THE CREDITS AWARDED. THE CREDITS AWARDED SHOULD BE CONSISTENT WITH STUDENT EFFORTS REQUIRED IN A TRADITIONAL CLASSROOM SETTING: N/A

11. PROPOSED TEXT BOOK(S) AND/OR OTHER REQUIRED INSTRUCTIONAL MATERIAL(S):

Lynn Marecek, Santa Ana College, *Intermediate Algebra*, OpenStax.org, 2017

Intermediate Algebra from OpenStax, Print ISBN 0998625728, Digital ISBN 1947172263, openstax.org/details/intermediate-algebra

12. REQUIRED COURSE FOR MAJOR OR AREA OF CONCENTRATION? Yes.

IF YES, COURSE IS REQUIRED, SUBMIT A SEPARATE CURRICULUM TRANSMITTAL COVER PAGE INDICATING A "CHANGE IN DEGREE OR CERTIFICATE REQUIREMENTS" AS WELL AS A PROPOSAL THAT MUST INCLUDE A RATIONALE AND THE FOLLOWING ADDITIONAL PAGES: A "CURRENT" DEGREE WITH ALL PROPOSED DELETIONS (STRIKEOUTS) AND ADDITIONS (BOLDED TEXT) CLEARLY INDICATED, AND A "PROPOSED" DEGREE, WHICH DISPLAYS THE DEGREE AS IT WILL APPEAR IN THE CATALOG (FOR A COPY OF THE MOST UP-TO-DATE DEGREE/CERTIFICATE REQUIREMENTS CONTACT AMANDA KALIN, EXT. 4611).

NYSED GUIDELINES OF 45 CREDITS OF LIBERAL ARTS COURSE WORK FOR AN ASSOCIATE OF ARTS DEGREE (A.A.), 30 CREDITS FOR AN ASSOCIATE OF SCIENCE DEGREE (A.S.), AND 20 CREDITS FOR AN APPLIED ASSOCIATE OF SCIENCE DEGREE (A.A.S.) MUST BE ADHERED TO FOR ALL 60 CREDIT PROGRAMS.

Allowing for the option of taking MAT 9A0, which will enable students to complete elementary and intermediate algebra in a single semester.

13. IF OPEN ONLY TO SELECTED STUDENTS SPECIFY POPULATION:

Open to students who satisfy the prerequisite (See 7A above)

14. EXPLAIN WHAT STUDENTS WILL KNOW AND BE ABLE TO DO UPON COMPLETION OF COURSE:

Students will be able to: evaluate algebraic expressions; solve linear equations; use the concepts of inequality symbols, absolute values, and distance on the number line; find the domain of an expression; perform basic algebraic operations on terms and polynomials; understand and use special product formulas; and master and use techniques of factoring.

Students will have developed skills in: manipulating and simplifying algebraic fractions; understanding negative exponents and applying exponent rules to them; understanding square, cube, and higher roots; simplifying roots and radicals and performing algebraic operations on them; rationalizing monomial and binomial denominators; understanding rational exponents; and applying the Pythagorean Theorem.

Students will: understand the distinction between identities and conditional equations, and the concept of solution sets; be able to solve quadratic equations by factoring, by completing the square, and by the quadratic formula; understand interval notation and be able to relate it to inequality notation and to graphs on the number line; understand and solve linear inequalities; and be able to apply the distance, midpoint, and slope formulas in the plane.

Students will: understand graphs of equations in two variables, and intercepts of graphs; be able to sketch graphs of linear equations; know how to determine slope and intercepts of a line directly from the equation; find equations of parallel and perpendicular lines; find both standard and general forms of the equation of a circle, and use either form to find the center and radius; be able to solve two linear equations in two variables.

15. METHODS OF TEACHING –E.G. LECTURES, LABORATORIES, AND OTHER ASSIGNMENTS FOR STUDENTS, INCLUDING ANY OF THE FOLLOWING: DEMONSTRATIONS, GROUP WORK, WEBSITE OR E-MAIL INTERACTIONS AND/OR ASSIGNMENTS, PRACTICE IN APPLICATION OF SKILLS, ETC.:

Mathematics 09A0 is taught by classroom lecture and demonstration of specific mathematical concepts, operations, and procedures, combined with homework assignments designed to improve and solidify student understanding and mastery of these concepts, operations and procedures.

16. ASSIGNMENTS TO STUDENTS: Assignments are taken from the textbook, and are chosen at the discretion of the instructor.

17. DESCRIBE METHOD OF EVALUATING LEARNING SPECIFIED IN #15 - INCLUDE PERCENTAGE BREAKDOWN FOR GRADING. IF A DEVELOPMENTAL COURSE INCLUDE HOW THE NEXT LEVEL COURSE IS DETERMINED AS WELL AS NEXT LEVEL PLACEMENT.

Evaluation is based upon regular classroom examinations and a final examination. The instructor will administer a final departmental Exit Exam that will constitute at least 40% of the final grade. The remaining part of the grade is to be divided between in-class tests, homework, quizzes, and lab work, at the discretion of the instructor. A grade of 62.5% (25/40) on the Exit Exam is **required** in order for students to pass the course. This will be deemed a necessary, but not necessarily sufficient criterion for passing the course.

18. TOPICAL COURSE OUTLINE FOR THE 12 WEEK SEMESTER (WHICH SHOULD BE SPECIFIC REGARDING TOPICS COVERED, LEARNING ACTIVITIES, AND ASSIGNMENTS):

Hours	Topics	Learning Objectives	Text Exercises
1	<p>Chapter 1: Foundations</p> <p>1.1 Use the Language of Algebra</p>	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *Find factors, prime factorizations, and least common multiples *Use variables and algebraic symbols *Simplify expressions using the order of operations *Evaluate an expression *Identify and combine like terms *Translate an English phrase to an algebraic expression 	p.21-22: all
1	1.2 Integers	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *Simplify expressions with absolute value *Add and subtract integers *Multiply and divide integers *Simplify expressions with integers *Evaluate variable expressions with integers 	p.37-39: problems 59-126

1	1.3 Fractions	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *Simplify fractions *Multiply and divide fractions *Add and subtract fractions 	p.52-54: problems 143-192
1	1.4 Decimals	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *multiply decimals by powers of 10 *Simplify expressions with square roots *Identify integers, rational numbers, irrational numbers, and real numbers *Locate fractions and decimals on the number line 	p.69-70: problems 263-268, 291-300, 301-306
1	1.5 Properties of Real Numbers	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *Use the commutative and associative properties *Use the properties of identity, inverse, and zero *Simplify expressions using the Distributive Property 	p.81-82: problems 335-380
2	<p>Chapter 2: Solving Linear Equations</p> <p>2.1 Use a General Strategy to Solve Linear Equations</p>	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *Solve linear equations using a general strategy *Classify equations *Solve equations with fraction or decimal coefficients 	p.111-113: all

1	Review Chapter 1, 2.1		p. 91-95: problems 388-393 397-412 416-423 458-463 p. 215: 496-501 511-514
1	Quiz #1		
1	Lab: 2.3 Solve a Formula for a Specific Variable	By the end of this section, students will be able to: *Solve a formula for a specific variable	p.144-145: problems 165-193 odd
2	Lab: 2.5 Solve Linear Inequalities	By the end of this section, students will be able to: *Graph inequalities on the number line *Solve linear inequalities	p.183-184: problems 296-337
2	2.6 Solve Compound Inequalities	By the end of this section, students will be able to: *Solve compound inequalities with "and" *Solve compound inequalities with "or" (*Solve applications with compound inequalities)	p.195-197: problems 376-425, (429, 433)
3	2.7 Solve Absolute Value Inequalities	By the end of this section, students will be able to: *Solve absolute value equations *Solve absolute value inequalities with "less than"	p.208-209: all

1	Review Chapter 2		p.215-222: problems 568-582, 593-603, 606-620, 625-643
1	Quiz #2		
1	Chapter 5: Polynomials and Polynomial Functions 5.1 Add and Subtract Polynomials	By the end of this section, students will be able to: *Determine the degree of polynomials *Add and subtract polynomials *Evaluate a polynomial function for a given value	p.497-499: problems 1-66
1	5.2 Properties of Exponents and Scientific Notation	By the end of this section, students will be able to: *Simplify expressions using the properties for exponents *Use the definition of a negative exponent	p.520-523: problems 81-161
2	5.3 Multiply Polynomials	By the end of this section, students will be able to: *Multiply monomials *Multiply a polynomial by a monomial *Multiply a binomial by a binomial *Multiply a polynomial by a polynomial *Multiply special products	p.536-538: problems 178-277

2	Lab: 5.4 Dividing Polynomials	By the end of this section, students will be able to: *Dividing monomials *Dividing a polynomial by a monomial *Dividing polynomials using long division *Dividing polynomials using synthetic division	p.551-552: problems 288-323
1 1	Review Chapter 5 Quiz #3		p.558-562: problems 342-364, 371-419, 430-480 p.564: problems 487-580
2	Chapter 6: Factoring 6.1 Greatest Common Factor and Factor by Grouping	By the end of this section, students will be able to: *Find the greatest common factor of two or more expressions *Factor the greatest common factor from a polynomial *Factor by grouping	p.572-573: problems 1-56
3	6.2 Factor Trinomials	By the end of this section, students will be able to: *Factor trinomials of the form $x^2 + bx + c$ *Factor trinomials of the form $ax^2 + bx + c$ using trial and error *Factor trinomials of the form $ax^2 + bx + c$ using the 'ac' method	p.589-590: problems 61-150

2	6.3 Factor Special Products	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *Factor perfect square trinomials *Factor differences of squares *Factor sums and differences of cubes 	p.603-604: problems 159-228
2	<p>Lab:</p> <p>6.4 General Strategy for Factoring Polynomials</p>	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *Recognize and use the appropriate method to factor a polynomial completely 	p.613: all
1 1	<p>Review Chapter 6</p> <p>Quiz #4</p>		p.634-636: problems 337-436 p.638: problems 445-458
1 1	<p>Review I - Chapters 1, 2, 5 & 6</p> <p>EXAM I</p>		
2	<p>Chapter 7: Rational Expressions and Functions</p> <p>7.1 Multiply and Divide Rational Expressions</p>	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *Determine the values for which a rational expression is undefined *Simplify rational expressions *Multiply rational expressions *Divide rational expressions 	p.651-653: problems 1-58

2	7.2 Add and Subtract Rational Expressions	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *Add and subtract rational expressions with a common denominator *Add and subtract rational expressions whose denominators are opposites *Find the least common denominator of rational expressions *Add and subtract rational expressions with unlike denominators *Add and subtract rational functions 	p.667-668: problems 75-142
1	7.3 Simplify Complex Rational Expressions	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *Simplify a complex rational expression by writing it as division *Simplify a complex rational expression by using the LCD 	p.680-681: problems 151-194
2	<p>Lab:</p> <p>7.4 Solve Rational Equations</p>	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *Solve rational equations *Solve a rational equation for a specific variable 	p.694: problems 197-226 p.695: problems 235-250
1	<p>Lab:</p> <p>7.5 Solve Applications with Rational Equations</p>	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *Solve proportions 	p.714: problems 253-262

1	Review Chapter 7		p.734-736: problems 377-422; p.737-738: problems 427-440, 443-452 p.741: problems 483-494
1	Quiz #5		
1	Chapter 8: Roots and Radicals 8.1 Simplify Expressions with Roots	By the end of this section, students will be able to: *Simplify expressions with roots *Estimate and approximate roots *Simplify variable expressions with roots	p.755-756: problems 1-50
2	8.2 Simplify Radical Expressions	By the end of this section, students will be able to: *Use the Product Property to simplify radical expressions *Use the Quotient Property to simplify radical expressions	p.771-773: problems 55-114
1	Lab: 8.3 Simplify Rational Exponents	By the end of this section, students will be able to: *Simplify expressions with $a^{1/n}$ *Simplify expressions with $a^{m/n}$ *Use the properties of exponents to simplify expressions with rational exponents	p.786-788: problems 119-158
2	8.4 Add, Subtract, and Multiply Radical Expressions	By the end of this section, students will be able to: *Add and subtract radical expressions *Multiply radical expressions *Use polynomial multiplication to multiply radical expressions	p.797-798: problems 165-214

2	8.5 Divide Radical Expressions	By the end of this section, students will be able to: *Divide radical expressions *Rationalize a one term denominator *Rationalize a two term denominator	p.810: problems 245-262 p.811: problems 271-282
1	Review Chapter 8		p.851-854: problems 481-532 & 535-537
1	Quiz #6		p.857: problems 579-595
1	Review II - Chapters 7 & 8		
1	EXAM II		
1	6.5 Polynomial Equations	By the end of this section, students will be able to: *Use the Zero Product Property *Solve quadratic equations by factoring	p.627: problems 277-312
3	Chapter 9: Quadratic Equations and Functions 9.1 Solve Quadratic Equations Using the Square Root Property	By the end of this section, students will be able to: *Solve quadratic equations of the form $ax^2 = k$ using the Square Root Property *Solve quadratic equations of the form $a(x - h)^2 = k$ using the Square Root Property	p.869-870: problems 1-68
1	Lab: 2.3 Solve a Formula for a Specific Variable	*Use Pythagorean Theorem	p.145: problems 203-206

2	<p>Lab:</p> <p>9.2 Solve Quadratic Equations by Completing the Square</p>	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *Complete the square of a binomial expression *Solve quadratic equations of the form $x^2 + bx + c = 0$ by completing the square *Solve quadratic equations of the form $ax^2 + bx + c = 0$ by completing the square 	p.885: problems 71-110
2	9.3 Solve Quadratic Equations Using the Quadratic Formula	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *Solve quadratic equations using the Quadratic Formula *Use the discriminant to predict the number and type of solutions of a quadratic equation *Identify the most appropriate method to use to solve a quadratic equation 	p.898-899: problems 113-153
1	Review Chapter 9		p.982-983: problems 395-454
1	Quiz #7		p.988: problems 529-535

2	<p>Chapter 3: Graphs and Functions</p> <p>Lab: 3.1 Graph Linear Equations in Two Variables</p>	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *Plot points in a rectangular coordinate system *Graph a linear equation by plotting points *Graph vertical and horizontal lines *Find the x- and y-intercepts *Graph a line using the intercepts 	p.250-253: all
3	<p>Lab: 3.2 Slope of a Line</p>	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *Find the slope of a line *Graph a line given a point and the slope *Graph a line using its slope and intercept *Choose the most convenient method to graph a line *Graph and interpret applications of slope-intercept *Use slopes to identify parallel and perpendicular lines 	p.274-278: all
3	<p>3.3 Find the Equation of a Line</p>	<p>By the end of this section, students will be able to:</p> <ul style="list-style-type: none"> *Find an equation of the line given the slope and y-intercept *Find an equation of the line given the slope and a point *Find an equation of the line given two points *Find an equation of a line parallel to a given line *Find an equation of a line perpendicular to a given line 	p.291-294: all

1 1	Review Chapter 3 Quiz #8		p.353-358: problems 391-447 odd, & 450-477
3	Chapter 11: Conics Lab: 11.1 Distance and Midpoint Formulas; Circles	By the end of this section, students will be able to: *Use the Distance Formula *Use the Midpoint Formula *Write the equation of a circle in standard form *Graph a circle	p.1082-1083: problems 1-48
1 1	Review Chapter 11 Quiz #9		p.1155-1156: problems 244-263 p.1160: problems 327-331
2	Chapter 4: Systems of Linear Equations Lab: 4.1 Solve Systems of Linear Equations with Two Variables	By the end of this section, students will be able to: *Determine whether an ordered pair is a solution of a system of equations *Solve a system of linear equations by graphing *Solve a system of equations by substitution *Solve a system of equations by elimination *Choose the most convenient method to solve a system of linear equations	p.385-387: problems 1-67

1	Review Chapter 4		p.479: problems 328-348
1	Quiz #10		p.485: problems 407-410
1	Review III - Chapters 3, 4, 9 & 11		
1	EXAM III		
2	Review - Final Exam	Instructor's Discretion	

19. SELECTED BIBLIOGRAPHY AND SOURCE MATERIALS:

- 1) Bennet, *Using and Understanding Mathematics: A Quantitative Reasoning Approach*, 6th Edition, Pearson, 2014.
- 2) Aufmann, *Mathematical Thinking and Quantitative Reasoning*, 1st Edition, Cengage Learning, 2007.
- 3) Johnson, *Mathematics: A Practical Odyssey*, 8th Edition, Brooks Cole, 2015.
- 4) Scott, *Cornerstones of Algebra: Problem Solving, Quantitative Reasoning, and Critical Thinking*, 1st Edition, Kendall Hunt Publishing, 2012.
- 5) Sons, Nicholls, and Stephen, *Mathematical Thinking and Quantitative Reasoning*, 5th Edition, Kendall Hunt Publishing, 2012.
- 6) Triola, *Elementary Statistics*, 12th Edition, Pearson, 2012.
- 7) Bluman, *Elementary Statistics: A Step-by-Step Approach*, 9th Edition, McGraw-Hill Education, 2013.
- 8) Larson and Farber, *Elementary Statistics: Picturing the World*, 6th Edition, Pearson, 2014.
- 9) Navidi and Monk, *Elementary Statistics*, 2nd Edition, McGraw-Hill 2015.
- 10) Tussy, *Elementary Algebra*, 5th Edition, Brooks Cole, 2012.
- 11) Bittinger, Ellenbogen and Johnson, *Elementary Algebra, Concepts & Applications*, 9th Edition, Pearson, 2012.
- 12) Jacobs, *Elementary Algebra*, Revised Edition, Master Books, 2016.
- 13) Rakes, Valentine, McGatha and Ronau, *Methods of Instructional Improvement in Algebra: A Systematic Review and Meta-Analysis*, Review of Educational Research, Volume: 80 issue: 3, page(s): 372-400, First Published September 1, 2010, <https://doi.org/10.3102/0034654310374880>,
- 14) Blitzer, *College Algebra*, 5th Edition, Pearson, 2010.
- 15) Fink, L.D. *Creating Significant Learning Experiences: An Integrated Approach to Designing College Courses*. San Francisco: Jossey-Bass, 2003.
- 16) Sullivan, *College Algebra*, 10th Edition, Pearson, 2016.
- 17) Jacobs, *Elementary Algebra*, 0th Edition, Freeman, 1979.

18) Fair, *Effectiveness of a Corequisite Delivery Model for Developmental Mathematics*,
Eastern Kentucky University Encompass, January 2017.

January 2019, SF

CUNY Common Core Course Submission Form

Instructions: All courses submitted for the Common Core must be liberal arts courses. Courses submitted to the Course Review Committee may be submitted for only one area of the Common Core and must be 3 credits. Colleges may submit courses to the Course Review Committee before or after they receive college approval. STEM waiver courses do not need to be approved by the Course Review Committee. This form should not be used for STEM waiver courses.

College	Kingsborough Community College of City University of New York
Course Prefix and Number (e.g., ANTH 101, if number not assigned, enter XXX)	MAT 09A0
Course Title	Algebra for STEM Majors
Department(s)	Mathematics and Computer Science Department
Discipline	Mathematics
Credits	3
Contact Hours	8
Pre-requisites (if none, enter N/A)	Prerequisite(s): For students who are eligible for a corequisite course per CUNY Math placement guidelines and likely to benefit from some developmental support, eligibility determined as follows: (1) Score of 40-56 on the Elementary Algebra portion of the ACCUPLACER CUNY Assessment Test in Math, or (2) passed MAT M100, or (3) passed a Kingsborough workshop culminating in passing the Departmental MAT M100 final exam, or (4) Appropriate corequisite designation.
Co-requisites (if none, enter N/A)	N/A
Catalogue Description	<p>This course is designed to provide students with an understanding of algebraic concepts, and skill and practice in the manipulation and utilization of these concepts. Such a background is essential for later mastery of a wide variety of courses in mathematics, computer studies, the sciences, and other areas. Topics include real numbers, absolute value, integer and rational exponents, polynomial operations, factoring techniques, roots and radicals, linear and quadratic equations, graphing techniques, systems of linear equations, Gaussian elimination, and an introduction to the study of functions.</p> <p>Students who have completed MAT 900 will <u>not</u> receive credit for this course.</p> <p>This course is appropriate for STEM major students.</p>
Special Features (e.g., linked courses)	
Sample Syllabus	Sample_Syllabus_MAT_09A0_pdf
<p>Indicate the status of this course being nominated:</p> <p><input type="checkbox"/> current course <input type="checkbox"/> revision of current course <input checked="" type="checkbox"/> a new course being proposed</p>	

CUNY COMMON CORE Location

Please check below the area of the Common Core for which the course is being submitted. (Select only one.)

<p>Required Core</p> <p><input type="checkbox"/> English Composition</p> <p><input checked="" type="checkbox"/> Mathematical and Quantitative Reasoning</p> <p><input type="checkbox"/> Life and Physical Sciences</p>	<p>Flexible Core</p> <p><input type="checkbox"/> World Cultures and Global Issues (A)</p> <p><input type="checkbox"/> US Experience in its Diversity (B)</p> <p><input type="checkbox"/> Creative Expression (C)</p> <p><input type="checkbox"/> Individual and Society (D)</p> <p><input type="checkbox"/> Scientific World (E)</p>
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Learning Outcomes

In the left column explain the course assignments and activities that will address the learning outcomes in the right column.

Required Core (12 credits)	
A. English Composition: Six credits	
A course in this area <u>must meet all the learning outcomes</u> in the right column. A student will:	
	<ul style="list-style-type: none"> ● Read and listen critically and analytically, including identifying an argument's major assumptions and assertions and evaluating its supporting evidence.
	<ul style="list-style-type: none"> ● Write clearly and coherently in varied, academic formats (such as formal essays, research papers, and reports) using standard English and appropriate technology to critique and improve one's own and others' texts.
	<ul style="list-style-type: none"> ● Demonstrate research skills using appropriate technology, including gathering, evaluating, and synthesizing primary and secondary sources.
	<ul style="list-style-type: none"> ● Support a thesis with well-reasoned arguments, and communicate persuasively across a variety of contexts, purposes, audiences, and media.
	<ul style="list-style-type: none"> ● Formulate original ideas and relate them to the ideas of others by employing the conventions of ethical attribution and citation.
B. Mathematical and Quantitative Reasoning: Three credits	
A course in this area <u>must meet all the learning outcomes</u> in the right column. A student will:	
<p>Inferences exist throughout the course devoted to analyzing a variety of graphs, utilizing formulae and tables. For examples: (1) In the sciences, we often need to change temperature from Fahrenheit to Celsius or vice versa. If you travel in a foreign country, you may want to change the Celsius temperature to the more familiar Fahrenheit temperature. Students are asked to solve the formula $C = 5/9(F - 32)$ for F. (2) Using the given graph of the relation, where some points are plotted on the Rectangular Coordinate System, to list the ordered pairs of the relation. (3) Recognizing and using the appropriate method to</p>	<ul style="list-style-type: none"> ● Interpret and draw appropriate inferences from quantitative representations, such as formulas, graphs, or tables.

<p>factor a polynomial completely. Students are able to use a general strategy for factoring polynomials, by dividing the problem into small steps: Step 1: Is there a greatest common factor? Factor it out. Step 2: Is the polynomial a binomial, trinomial, or are there more than three terms? If it is a binomial: ◦ Is it a sum? Of squares? Sums of squares do not factor. Of cubes? Use the sum of cubes pattern. ◦ Is it a difference? Of squares? Factor as the product of conjugates. Of cubes? Use the difference of cubes pattern. If it is a trinomial: ◦ Is it of the form $ax^2 + bx + c$? Undo FOIL. ◦ Is it of the form $ax^2 + bx + c$? If a and c are squares, check if it fits the trinomial square pattern. Use the trial and error or “ac” method. If it has more than three terms: ◦ Use the grouping method. Step 3: Check. Is it factored completely? Do the factors multiply back to the original polynomial?</p>	
<p>A few chapters (2 & 6.5, 9) are devoted to solving various equations using algebraic methods. In Chapter 2, students learn to solve linear equations using the Properties of Equality and a general strategy. They use a problem-solving strategy to solve number applications. Solving a formula for a specific variable, and also solving both linear and compound inequalities is presented. For example (p. 188): Solve $6x - 3 < 9$ and $2x + 7 \geq 3$. Graph the solution and write the solution in interval notation. Students understand that in order to find the solution of the compound inequality, they will look at the graphs of each inequality and then find the numbers that belong to both graphs—where the graphs overlap. In Chapter 6.5, students learn the process of factoring expressions and see how factoring is used to solve quadratic equations. In Chapter 9, students use various methods to solve quadratic equations and learn how to use them in applications. For example (p. 897): Students are able to identify the most appropriate method to solve a quadratic equation.</p>	<ul style="list-style-type: none"> ● Use algebraic, numerical, graphical, or statistical methods to draw accurate conclusions and solve mathematical problems.
<p>One module is devoted to interpreting the given information and determining relationship between quantities.</p> <p>For example (p. 267): Interpret information given in the equation $C = 0.5m + 60$ that models the relation between one's weekly cost, C, in dollars and the number of miles, m, that one drives. Students need to interpret the slope and C-intercept of the equation.</p> <p>Students are asked to determine whether these two quantities are correlated, and calculate one's cost for a week when one drives various number of miles (i.e. 0 miles, 250 miles, etc). After they evaluate the given equation for different values, students write them in a table, and graph the equation. As a result, they have to understand that the cost of running some types business have two components—a fixed cost and a variable cost. The fixed cost is always the same regardless of how many units are produced. This is the cost of rent, insurance, equipment, advertising, and other items that must be paid regularly. The variable cost depends on the number of units produced. It is for the material and labor needed to produce each item</p>	<ul style="list-style-type: none"> ● Represent quantitative problems expressed in natural language in a suitable mathematical format.
<p>This can apply to the majority of the course. In particular, in Chapter 2 (p. 97), where the students will learn how to solve linear inequalities, they will understand what the solutions mean and how they can</p>	<ul style="list-style-type: none"> ● Effectively communicate quantitative analysis or solutions to mathematical problems in written or oral form.

<p>represent them in multiple formats to enhance their understanding of the interpretation of those solutions.</p> <p>For example, (p. 183) the students need to solve $12x + 3(x + 7) > 10x - 24$. Using the allowed algebraic operations outlined earlier in the chapter (p. 99) to solve algebraic equations, the students can get the solution $x > -9$. They can then graph it on the real number line, and express it in interval notation as $(-9, \infty)$.</p>	
<p>In one module, where the students are finding solutions to polynomial equations using the Zero Product Property (p.616), they can predict the number of possible solutions based on the degree of the given polynomial equation. If the polynomial equation has degree 1, they can determine that there will be at most one solution. If the polynomial equation has degree 2, then the students can surmise that the equation has at most two solutions.</p> <p>In another example, (Ex 6.54 on p. 624) the students can use the previous techniques to solve an instance of the Pythagorean Theorem, where one leg of a right triangle has length x, one leg has length $x - 7$ and the hypotenuse has length 17. The application of the Pythagorean Theorem gives $x^2 + (x - 7)^2 = 17^2$. Using the techniques of the previous section, two solutions $x = -8$ and $x = 15$ are found. However utilizing their notions of distance and length, the students can discard the negative solution as a distance must be a positive valued number and determine that $x = 15$ is the correct solution.</p>	<ul style="list-style-type: none"> ● Evaluate solutions to problems for reasonableness using a variety of means, including informed estimation.
<p>In one module, (Chapter 3, p. 225) where the students move from analyzing one dimensional space, into a 2 dimensional plane, the text brings the real world use of virtual reality. This technology creates realistic images that make one feel as if they are truly immersed in the scene and even enables users to interact with them. It is being developed for fun applications, such as video games, but also for architects to plan buildings, car companies to design prototypes, the military to train, and medical students to learn. Developing virtual reality devices requires modeling the environment using graphs and mathematical relationships. In this model the students will graph different relationships and learn ways to describe and analyze graphs.</p> <p>For example, (p. 226) the students are shown the connection between maps containing a grid system and the Cartesian Plane. An <i>ordered pair</i>, (x, y) gives the coordinates of a point in a rectangular coordinate system. The first number is the x-coordinate. The second number is the y-coordinate. The students can then see the ordered pair as a set of directions with the x-coordinate giving horizontal directions and the y-coordinate giving the vertical direction.</p>	<ul style="list-style-type: none"> ● Apply mathematical methods to problems in other fields of study.