**KINGSBOROUGH COMMUNITY COLLEGE**
**The City University of New York**

**CURRICULUM TRANSMITTAL COVER PAGE**

**Department:** Department of Mathematics & Computer Science **Date:** 02/07/2022

**Title Of Course/Degree/Concentration/Certificate:** Introduction to Mathematics with College Algebra (MAT 9010)

**Change(s) Initiated: (Please check)**

- ☐ **Closing of Degree**
- ☐ **Closing of Certificate**
- ☐ **New Certificate Proposal**
- ☐ **New Degree Proposal**
- ☑ **New Course**
- ☐ **New 82 Course (Pilot Course)**
- ☐ **Deletion of Course(s)**
- ☐ **Change in Degree or Certificate**
- ☐ **Change in Degree: Adding Concentration**
- ☐ **Change in Degree: Deleting Concentration**
- ☐ **Change in Prerequisite, Corequisite, and/or Pre-/Co-requisite**
- ☐ **Change in Course Designation**
- ☐ **Change in Course Description**
- ☐ **Change in Course Title, Number, Credits and/or Hours**
- ☐ **Change in Academic Policy**
- ☐ **Pathways Submission:**
  - ☐ **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**
- ☐ **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:** 02/07/2022 **Signature, Committee Chairperson:** Rina Garmish

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

**Date Approved:** 02/16/22 **Signature, Department Chairperson:** John Mikalopas

**Date Approved:** 02/16/22 **Signature, Department Chairperson:** Mary Dawson

**Date Approved:** 02/17/22 **Signature, Department Chairperson:** Richard Frusciona

**Date Approved:** _____ **Signature, Department Chairperson:** _____

**Date Approved:** _____ **Signature, Department Chairperson:** _____

**I have reviewed the attached material/proposal**

**Signature, Department Chairperson:** Rina Garmish

KINGSBOROUGH COMMUNITY COLLEGE
★ DREAMS BEGIN HERE ★

TO: Spring 2022 Curriculum Committee

FROM: Department of Mathematics & Computer Science

DATE: 02/07/2022

RE: New Course: Introduction to Mathematics with College Algebra (MAT 9010)

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The Department of Mathematics & Computer Science is proposing to add a new course, in the following manner:

**ADD:**
MAT 9010 – Introduction to Mathematics with College Algebra

**Rationale for Change:**

The proposed course represents a new pedagogical approach to College Algebra with more supported interaction for preparing students who have not achieved CUNY mathematics proficiency, and who are in need of College Algebra to fulfill the requirements of their majors.

Students will work in a laboratory setting with an instructor and will be provided hands-on, personalized guidance in the development and fine-tuning of algebraic skills. This approach will facilitate success for students who would not otherwise succeed in College Algebra.

Additionally, this course aligns with the upcoming CUNY transition, effective Fall 2022, to:
(1) Remove all remedial course offerings, including MAT M1, MAT M2 and MAT R3 (Elementary Algebra II) but
(2) Precede the first-level Pathways MQR course, which for KCC STEM majors is MAT 9 (College Algebra).

Currently students who are not Math Proficient enroll as follows:

MAT M100 (Basic Mathematics); then MAT M200 (Elementary Algebra); then MAT R300 (Elementary Algebra II); then MAT 900 (College Algebra), followed by MAT 14 (Analytic Geometry and Pre-Calculus Mathematics).

MAT 9010 will allow students to proceed to MAT 1400 within 2 semesters:
MAT 9010 to MAT 1400

This course also meets the concerns outlined by CUNY for Algebra Proficiency Standard for Students Pursuing STEM Degrees –which "allows for up to two additional hours of corequisite support in college algebra to develop a strong foundation for further STEM-focused algebra sequences." MAT 09010 adds 2 hours of corequisite support over MAT 0900.

The current MAT 900 (College Algebra) is 3 credits, 4 hours.
The proposed co-requisite course, MAT 9010 (Introduction to Mathematics with College Algebra) is 3 credits, 6 hours.

Once the course is in place, the department plans to conduct an analysis of student success, including such factors as grade distribution and particularly Exit Exam performance in MAT 09010 as compared/contrasted with those of MAT 900 and MAT 9B0, and assessment of both global and particular essential skills needed for STEM students going forward. One interesting potential avenue for such study will be the relative emphases on specific skill sets which have particular value for different avenues of study within STEM (health sciences vs engineering, for example) with possible future potential for customization within laboratory-based activities.

The department is hopeful that this new approach will provide much-enhanced student success for our students who have not achieved CUNY mathematics proficiency, and who require expertise in Algebra.

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# New Course Proposal Form*

*This form is **NOT** intended for Internships or Field Work

1. Complete the requested course information in the table below. Indicate "**NONE**" where applicable.
   *For Assignment of New Course Number, contact **Academic Scheduling**.

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|---|---|
| **Department:** | Mathematics and Computer Science |
| **Course Designation/Prefix:** | MAT |
| ***Course Number:** | 9010 |
| **Course Title:** | Introduction to Mathematics with College Algebra |
| **Course Description:**<br>**(Note: Description should include language similar to Course Learning Outcomes.)** | 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.<br><br>**Students who have completed MAT 900 or MAT 9B0 will not receive credit for this course.**<br><br>This course is appropriate for students majoring in STEM areas. |
| **Prerequisite(s):** | For students who are eligible for a corequisite course per CUNY Math placement guidelines and are in need of developmental support. |
| **Corequisite(s):** | N/A |
| **Pre-/Co-requisite(s):** | N/A |
| **Open ONLY to Select students (Specify Population):** | Open to students who satisfy the prerequisite |

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| **Frequency course is to be offered (Select All that Apply)** | ☒ Fall ☒ Winter ☒ Spring ☒ Summer |
| **Suggested Class Limit:** | 25 |
| **Indicate if a special space, such as a lab, and/or special equipment will be required:** | |

2. Credits and Hours based on MSCHE Guidelines for *College Credits Assigned for Instructional Hours* **-*Hours are based on hours per week in a typical 12-week semester** (Please check **ONE** box based on credits):

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| 1-credit: | ☐ 1 hour lecture<br>☐ 2 hours lab/field/gym |
| 2-credits: | ☐ 2 hours lecture<br>☐ 1 hour lecture, 2 hours lab/field<br>☐ 4 hours lab/field |
| 3-credits: | ☐ 3 hours lecture<br>☐ 2 hours lecture, 2 hours lab/field<br>☐ 1 hour lecture, 4 hours lab/field<br>☒ 6 hours lab/field |
| 4-credits: | ☐ 4 hours lecture<br>☐ 3 hours lecture, 2 hours lab/field<br>☐ 2 hours lecture, 4 hours lab/field<br>☐ 1 hour lecture, 6 hours lab/field<br>☐ 8 hours lab/field |
| More than 4-credits: | ☐ Number of credits: ____ (explain mix lecture/lab below)<br>___ Lecture ____Lab<br>Explanation:_____ |

3. **Where** does this course fit? Select from the following:

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| ☐ Degree Program(s)/Certificate(s)* | **List Degree Program(s)/Certificate(s):**<br>1.<br>2. |

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| ☒ General Education/Pathways | **Select ONE of the following:**<br>☐ Life and Physical Science (LPS)<br>☑ Math and Quantitative Reasoning (MQR)<br>☐ World Cultures and Global Issues (Group A)<br>☐ U.S. Experience in its Diversity (Group B)<br>☐ Creative Expression (Group C)<br>☐ Individual and Society (Group D)<br>☑ Scientific World (Group E) |
| ☐ **82XX** Pilot/Experimental Course | **If proposed as a "real" course, where will this course fit?**<br>Select from the following:<br><br>**List Degree Program(s)/Certificate(s):**<br>1.<br>2.<br><br>**Select ONE of the following:**<br>☐ Life and Physical Science (LPS)<br>☐ Math and Quantitative Reasoning (MQR)<br>☐ World Cultures and Global Issues (Group A)<br>☐ U.S. Experience in its Diversity (Group B)<br>☐ Creative Expression (Group C)<br>☐ Individual and Society (Group D)<br>☐ Scientific World (Group E) |

***If Degree Program/Certificate is Selected:**

- Include an updated **Curricular** Map (Program Learning Outcomes) for each Degree Program/Certificate listed above.
- Include an updated Degree Map (semester-by-semester course sequence) for each Degree Program/Certificate listed above. For Degree Map template, contact Amanda Kalin, ext. 4611, Amanda.Kalin@kbcc.cuny.edu

The Following NYSED Guidelines must be adhered to for **ALL** Degree Programs:

45 credits of Liberal Arts (General Education) course work for an Associate of Arts Degree (AA)
30 credits of Liberal Arts (General Education) course work for an Associate of Science Degree (AS)
20 credits of Liberal Arts (General Education) course work for an Applied Associate of Science (AAS)

**Additional Separate Submissions Required**:

1. Curriculum Transmittal Cover Page indicating a "Change in Degree or Certificate"
2. Memo with rationale for inclusion of the course within the curriculum
3. "Current" Degree with all proposed deletions (strikeouts) and additions (bolded) clearly indicated

4. "Proposed" Degree, which displays the degree as it will appear in the *College Catalog*

For a copy of the most up-to-date Degree/Certificate requirements contact Amanda Kalin, ext. 4611, Amanda.Kalin@kbcc.cuny.edu

**If General Education/Pathways is Selected:**

- Please refer to NYSED Guidelines for courses that are considered Liberal Arts (General Education).
- Pilot/Experimental/82XX courses CANNOT be submitted for Pathways until they are submitted as a "**real**" course.

**Additional Separate Submissions Required**:

1. Curriculum Transmittal Cover Page indicating BOTH "New Course" and "Pathways"
2. CUNY Common Core Pathways Submission Form

4. **List the Course Learning Outcomes** – Course Learning Outcomes are measureable/demonstrable, containing "**action verbs**" (Blooms Taxonomy). If proposed to PATHWAYS, the Course Learning Outcomes should significantly align with the Pathways Learning Outcomes (refer to the Pathways Common Core Submission Form for Pathways Learning Outcomes). If proposed for a Degree program, the course should align with the Program Learning Outcomes (PLOs). **REMINDER** – Course Learning Outcomes are consistent for **ALL sections** of the same course and **MUST** be included on the syllabus.

| **Course Learning Outcomes** |
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| 1. Gather, interpret, and assess information from a variety of sources and points of view. |
| 2. Evaluate evidence and arguments critically or analytically. |
| 3. Produce well-reasoned written or oral arguments using evidence to support conclusions. |
| 4. Identify and apply the fundamental concepts and methods of a discipline or interdisciplinary field exploring the scientific world, including, but not limited to: computer science, history of science, life and physical sciences, linguistics, logic, mathematics, psychology, statistics, and technology-related studies. |
| 5. Demonstrate how tools of science, mathematics, technology, or formal analysis can be used to analyze problems and develop solutions. |
| 6. Articulate and evaluate the empirical evidence supporting a scientific or formal theory. |

5. **Assessment of Course Learning Outcomes**: The Course Learning Outcomes are measurable/demonstrable through the below listed sample assignments/activities. Include percentage breakdown for grading. **REMINDER -** Assessment of Course Learning Outcomes are based on a **Common Syllabus** – to allow for **any** qualified instructor to teach the course.

| **Course Learning Outcome** | **Percentage of Grade** | **Measurement of Learning Outcome (Artifact/Assignment/Activity)** |
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| 1. Gather, interpret, and assess information from a variety of sources and points of view. | 15% | Throughout the course devoted to satisfying this objective based on gathering, analyzing, and comparing evidence from more than one perspective. For example, in Chapter 2, the students are able to solve linear equations using a general strategy, classify equations, and solve equations with fraction or decimal coefficients. They can use the General Strategy to solve $\frac{1}{12}x + \frac{5}{6} = \frac{3}{4}$. This method would work fine, but many students do not feel very confident when they see all those fractions. So, they need |

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| | | to evaluate this strategy and understand that there is an alternate method to solve equations with fractions. This alternate method eliminates the fractions applying the Multiplication Property of Equality and multiplying both sides of an equation by the least common denominator (LCD) of all the fractions in the equation. The result of this operation will be a new equation, equivalent to the first, but without fractions. This process is called *clearing* the equation of fractions. To clear an equation of decimals, we think of all the decimals in their fraction form and then find the LCD of those denominators. Another example comes from Chapter 6.4, where students will be able to recognize and use the appropriate method to factor a polynomial completely. When students are asked to factor completely $24y^2 - 150$, they have to put together, understand, and evaluate the given information in order to use the appropriate method. |
| 2. Evaluate evidence and arguments critically or analytically. | 10% | In order to solve any algebraic problem, students need to assess facts and arguments critically and analytically. For example, in Chapter 5.2, students are able to simplify expressions using the properties for exponents. They need to decide which rule(s) to use to simplify an expression of the form, $\frac{(-5x^3y)^3}{-10xy^{-2}}$. Another example that satisfies this objective can be found in Chapter 6.5, when students solve quadratic equations by factoring and use the *Zero Product Property*, that says that if the product of two quantities is zero, then at least one of the quantities is zero. The only way to get a product equal to zero is to multiply by zero itself. This method works very nicely to solve quadratic equations. Students are asked to solve $2y^2 = 13y + 45$. First of all, students understand that before using the factoring strategy, they have to write the quadratic equation in standard form, $ax^2 + bx + c = 0$, then they can factor the expression on the left, $2y^2 - 13y - 45 = 0$, using *AC Method*, learned in Chapter 6.4; After factoring they use the Zero Product Property by setting each factor equal to zero. Now, students understand that they have to solve two linear equations, and check the solutions in the original equation. |
| 3. Produce well-reasoned written or oral arguments using evidence to support conclusions | 18% | Throughout the course students are asked to produce well-reasoned written or oral arguments using evidence to support conclusions. For example, in Chapter 8, *Roots and Radicals*, students simplify expressions with radicals, add, subtract, multiply and divide radical expressions, and simplify rational exponents. In this particular chapter, students understand that if $\boldsymbol{b^n = a}$, then b is an $\mathbf{n^{th}}$ root of a, and is written as $\sqrt[n]{\boldsymbol{a}}$, where n is called the index of the radical. If n is an even number and $a \geq 0$, then $\sqrt[n]{\boldsymbol{a}}$ is a real number, and if $a < 0$, then $\sqrt[n]{\boldsymbol{a}}$ is not a real number. When n is an odd number, $\sqrt[n]{\boldsymbol{a}}$ is a real number for all values of a. |
| 4. . Identify and apply the fundamental concepts and methods of a discipline or interdisciplinary field | 18% | This can be satisfied by the majority of the course. Many concepts in algebra are applicable in most of the topics of |

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| exploring the scientific world, including, but not limited to: computer science, history of science, life and physical sciences, linguistics, logic, mathematics, psychology, statistics, and technology-related studies. | | the course. For example, in Chapter 1, the students look at the properties of real numbers. The *commutative* property of addition is a property of real numbers which applies to *order*. This is the property that for all real numbers, $a + b = b + a$. The *associative* property of *addition* for real numbers is a property about *grouping*. This property indicates that for all real numbers $(a + b) + c = a + (b + c)$. The *distributive* property for addition for real numbers is that $a(b + c) = ab + ac$. These properties are applied extensively throughout the course and in subsequent mathematics courses. |
| 5. Demonstrate how tools of science, mathematics, technology, or formal analysis can be used to analyze problems and develop solutions. | 24% | Again, the majority of the course is in service of applications of mathematics to analyze problems. More specifically, in Chapter 6, they discuss the techniques of factoring polynomials which are applied based on the number of terms in the polynomial. The number of terms in the polynomial indicate the pattern to look for to apply the appropriate technique. For example, a two term polynomial, called a binomial, can have the pattern of the *difference between two squares*, $\boldsymbol{a^2 - b^2}$ or the *sum of two cubes,* $\boldsymbol{a^3 + b^3}$, or the *difference between two cubes,* $\boldsymbol{a^3 - b^3}$**.** If none of these patterns apply to the binomial then the polynomial is not factorable. |
| 6. Articulate and evaluate the empirical evidence supporting a scientific or formal theory. | 15% | Much of scientific theory is expressed in language of mathematics. There a many areas which are described in particular, by polynomial equations. Quadratic equations appear, for example, in physics, to describe the motion of an object or engineering, to design the structure of a parabolic reflector, which is a fundamental part of a car headlight.. In Chapter 9, they develop methods to solve quadratic equations, using methods such as the *Square Root Method*, the *Zero Product Property* and the *quadratic formula* given by $\mathbf{x = \sqrt{b\text{^}2 - 4ac}/2a.}$ |

6. **Who** is expected to enroll in this course? Please provide details for the student population(s), degree program(s)/certificate(s), and applicable concentration(s), this course is expected to include.

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| This course is appropriate for students majoring in STEM areas. |

7. Explain **why** this course is a necessary addition to the curriculum. **REMINDER** – Explain the course's role within the selected Pathways Group or Degree program – How does this course meet the Program Learning Outcomes (PLOs)? Was the course a recommendation from a recent Annual Program Review (APR), Advisory Board, Accrediting Body, etc.? How might this course help students seeking to transfer to a 4-yr college or transition into a career after KCC?

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.

8. Upon transfer, does this course meet a specified requirement for a degree at a 4-year institution? If so, please include the institution and degree program. It is recommended you review your current Articulation Agreements.

9. Will adding the course potentially **conflict** with other courses – in content or subject matter – offered in either your Department or in *another* Department? If it will, please explain **how** and indicate **why** the course is still necessary.

No conflicts.

10. Proposed textbook(s) and/or other required instructional material(s), including open educational resources (OER)– Please include any supplemental/recommended materials/texts to allow for **any** qualified instructor to teach the course:

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

11. **Attach a Common Syllabus** that includes the Topical Course Outline for the 12-week semester. This should be specific and explicit regarding the topics covered and should contain the detailed sample assignments/activities being used to measure the Course Learning Outcomes. **REMINDER** – be mindful to focus on the Course Learning Outcomes, Course Content, and Assessment.

Evaluation is based upon classroom examinations, classroom performance and a comprehensive departmental final examination. The percentage breakdown is left up to the instructor. To pass this course, the student must pass the final examination.

Topical Course Outline for the 12-week semester.

| Hours | Topics | Learning Objectives | Text Exercises |
|---|---|---|---|
| **1** | **Chapter 1: Foundations**<br><br>1.1 Use the Language of Algebra | By the end of this section, students will be able to:<br>*Find factors, prime factorizations, and least common multiples<br>*Use variables and algebraic symbols<br>*Simplify expressions using the order of operations<br>*Evaluate an expression<br>*Identify and combine like terms<br>*Translate an English phrase to an algebraic expression | p.21-22: all |
| **1** | 1.2 Integers | By the end of this section, students will be able to:<br>*Simplify expressions with absolute value<br>*Add and subtract integers<br>*Multiply and divide integers<br>*Simplify expressions with integers<br>*Evaluate variable expressions with integers | p.37-39:<br>problems 59-126 |
| **1** | 1.3 Fractions | By the end of this section, students will be able to:<br>*Simplify fractions<br>*Multiply and divide fractions<br>*Add and subtract fractions | p.52-54:<br>problems<br>143-192 |

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| **1** | 1.4 Decimals | By the end of this section, students will be able to:<br>*multiply decimals by powers of 10<br>*Simplify expressions with square roots<br>*Identify integers, rational numbers, irrational numbers, and real numbers<br>*Locate fractions and decimals on the number line | p.69-70:<br>problems<br>263-268,<br>291-300, 301-306 |
| **1** | 1.5 Properties of Real Numbers | By the end of this section, students will be able to:<br>*Use the commutative and associative properties<br>*Use the properties of identity, inverse, and zero<br>*Simplify expressions using the Distributive Property | p.81-82:<br>problems<br>335-380 |
| **1** | **Chapter 2: Solving Linear Equations**<br><br>2.1 Use a General Strategy to Solve Linear Equations | By the end of this section, students will be able to:<br>*Solve linear equations using a general strategy<br>*Classify equations<br>*Solve equations with fraction or decimal coefficients | p.111-113: all |
| **1** | **Quiz #1** | | **Review Chapter 1, 2.1**<br>p. 91-95:<br>problems<br>388-393<br>397-412<br>416-423<br>458-463<br>p. 215: 496-501 |

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| | | | 511-514 |
| **1** | 2.3 Solve a Formula for a Specific Variable | By the end of this section, students will be able to:<br>*Solve a formula for a specific variable | p.144-145:<br>problems 165-193 odd |
| **1** | 2.5 Solve Linear Inequalities | By the end of this section, students will be able to:<br>*Graph inequalities on the number line<br>*Solve linear inequalities | p.183-184:<br>problems 296-337 |
| **1** | 2.6 Solve Compound Inequalities | By the end of this section, students will be able to:<br>*Solve compound inequalities with "and"<br>*Solve compound inequalities with "or"<br>(*Solve applications with compound inequalities) | p.195-197:<br>problems 376-425, (429, 433) |
| **2** | 2.7 Solve Absolute Value Inequalities | By the end of this section, students will be able to:<br>*Solve absolute value equations<br>*Solve absolute value inequalities with "less than" | p.208-209: all |

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

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

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| **1** | 6.3 Factor Special Products | By the end of this section, students will be able to:<br>*Factor perfect square trinomials<br>*Factor differences of squares<br>*Factor sums and differences of cubes | p.603-604:<br>problems 159-228 |
| **2** | 6.4 General Strategy for Factoring Polynomials | By the end of this section, students will be able to:<br>*Recognize and use the appropriate method to factor a polynomial completely | p.613: all |
| **1** | **Quiz #4** | | **Review Chapter 6**<br>p.634-636:<br>problems 337-436<br>p.638: problems 445-458 |
| **1** | **Chapters 1, 2, 5 & 6**<br>**EXAM I** | | |
| **1** | **Chapter 7: Rational Expressions and Functions**<br>7.1 Multiply and Divide Rational Expressions | By the end of this section, students will be able to:<br>*Determine the values for which a rational expression is undefined<br>*Simplify rational expressions<br>*Multiply rational expressions<br>*Divide rational expressions | p.651-653:<br>problems 1-58 |

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| **2** | 7.2 Add and Subtract Rational Expressions | By the end of this section, students will be able to:<br>*Add and subtract rational expressions with a common denominator<br>*Add and subtract rational expressions whose denominators are opposites<br>*Find the least common denominator of rational expressions<br>*Add and subtract rational expressions with unlike denominators<br>*Add and subtract rational functions | p.667-668: problems 75-142 |
| **1** | 7.3 Simplify Complex Rational Expressions | By the end of this section, students will be able to:<br>*Simplify a complex rational expression by writing it as division<br>*Simplify a complex rational expression by using the LCD | p.680-681: problems 151-194 |
| **2** | 7.4 Solve Rational Equations | By the end of this section, students will be able to:<br>*Solve rational equations<br>*Solve a rational equation for a specific variable | p.694: problems 197-226<br>p.695: problems 235-250 |
| **1** | 7.5 Solve Applications with Rational Equations | By the end of this section, students will be able to:<br>*Solve proportions | p.714: problems 253-262 |

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

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

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| **2** | 9.2 Solve Quadratic Equations by Completing the Square | By the end of this section, students will be able to:<br>*Complete the square of a binomial expression<br>*Solve quadratic equations of the form $x^2 + bx + c = 0$ by completing the square<br>*Solve quadratic equations of the form $ax^2 + bx + c = 0$ by completing the square | p.885:<br>problems 71-110 |
| **2** | 9.3 Solve Quadratic Equations Using the Quadratic Formula | By the end of this section, students will be able to:<br>*Solve quadratic equations using the Quadratic Formula<br>*Use the discriminant to predict the number and type of solutions of a quadratic equation<br>*Identify the most appropriate method to use to solve a quadratic equation | p.898-899:<br>problems 113-153 |
| **1** | **Quiz #7** | | **Review Chapter 9**<br>p.982-983:<br>problems 395-454<br>p.988:<br>problems 529-535 |

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| **2** | **Chapter 3: Graphs and Functions**<br><br>3.1 Graph Linear Equations in Two Variables | By the end of this section, students will be able to:<br>*Plot points in a rectangular coordinate system<br>*Graph a linear equation by plotting points<br>*Graph vertical and horizontal lines<br>*Find the x- and y-intercepts<br>*Graph a line using the intercepts | p.250-253: all |
| **3** | 3.2 Slope of a Line | By the end of this section, students will be able to:<br>*Find the slope of a line<br>*Graph a line given a point and the slope<br>*Graph a line using its slope and intercept<br>*Choose the most convenient method to graph a line<br>*Graph and interpret applications of slope–intercept<br>*Use slopes to identify parallel and perpendicular lines | p.274-278: all |
| **3** | 3.3 Find the Equation of a Line | By the end of this section, students will be able to:<br>*Find an equation of the line given the slope and y-intercept<br>*Find an equation of the line given the slope and a point<br>*Find an equation of the line given two points<br>*Find an equation of a line parallel to a given line<br>*Find an equation of a line perpendicular to a given line | p.291-294: all |

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

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

12. Selected Bibliography and Source materials:


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m. 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,
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r. Fair, *Effectiveness of a Corequisite Delivery Model for Developmental Mathematics,* Eastern Kentucky University Encompass, January 201