

# MATH 054: BEGINNING ALGEBRA

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**Originator**

mflora

**Justification / Rationale**

Periodic update, adding modalities, and reducing class size to improve student interaction for lab activities

**Effective Term**

Fall 2022

**Credit Status**

Credit - Non Degree Applicable

**Subject**

MATH - Mathematics

**Course Number**

054

**Full Course Title**

Beginning Algebra

**Short Title**

BEGINNING ALGEBRA

**Discipline****Disciplines List**

Mathematics

**Modality**

Face-to-Face

100% Online

Hybrid

**Catalog Description**

This course is an introduction to the real number system and to the use of variable expressions and equations in problem solving. Topics include properties of the real numbers, square roots, arithmetic of variable expressions including polynomials and algebraic fractions, solving linear equations and inequalities in one variable, factoring, and an introduction to the Cartesian coordinate system and the equations and graphs of linear equations in two variables. Also, the proper use of math notation is emphasized along with an introduction to Pythagorean Theorem and basic geometric formulas, some dimensional analysis with modeling applications is included.

**Schedule Description**

This introductory algebra course focuses on the arithmetic of variable expressions and the solving of single variable equations, including basic applications involving these. There is also an introduction to the Cartesian coordinate system and the graphing of linear equations in two variables. Prerequisite: MATH 060 or MATH 065 Advisory: ENG 061

**Lecture Units**

3

**Lecture Semester Hours**

54

**Lab Units**

1

**Lab Semester Hours**

54

**In-class Hours**

108

**Out-of-class Hours**

108

**Total Course Units**

4

**Total Semester Hours**

216

**Prerequisite Course(s)**MATH 060 or MATH 065  
Advisory: ENG 061**Required Text and Other Instructional Materials****Resource Type**

Book

**Open Educational Resource**

No

**Author**

Lial M., Hornsby J., McGinnis T

**Title**

Beginning Algebra

**Edition**

13

**Publisher**

Pearson

**Year**

2020

**College Level**

Yes

**ISBN #**

9780134994994

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**Resource Type**

Web/Other

**Open Educational Resource**

No

**Year**

N/A

**Description**Pearson MyLab and Mastering to be paired with Lial, Hornsby, McGinnis book

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**Resource Type**

Book

**Open Educational Resource**

Yes

**Author**

Lynn Maracek, MaryAnne Anthony-Smith, Andrea Honeycutt Mathis

**Title**

Elementary Algebra

**Edition**

2

**City**

Houston

**Publisher**

OpenStax

**Year**

2020

**College Level**

No

**Flesch-Kincaid Level**

9.4

**ISBN #**

978-1-975076-47-4 (Hardback version)

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**Resource Type**

Web/Other

**Open Educational Resource**

Yes

**Year**

n/a

**Description**

MyOpenMath is online courseware that may be used with any textbook

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**Resource Type**

Web/Other

**Open Educational Resource**

No

**Year**

n/a

**Description**

WebAssign may be used with the OpenStax textbook

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**Class Size Maximum**

30

**Entrance Skills**

Compute using the four basic operations of addition, subtraction, multiplication, and division on the rational numbers in both fraction and decimal form.

**Requisite Course Objectives**

MATH 060-Compute using the four basic operations of addition, subtraction, multiplication, and division on the rational numbers in both fraction and decimal form.

MATH 065-Demonstrate proficiency in basic number facts (addition, subtraction, multiplication, division of integer numbers).

MATH 065-Compute using the four basic operations of addition, subtraction, multiplication, and division on the rational numbers in both fraction and mixed number forms.

MATH 065-Apply the basic operations to solve application problems that involve integer numbers, decimals, mixed numbers and rational numbers.

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**Entrance Skills**

Apply the basic operations to solve application problems that involve whole numbers, integers, and rational numbers.

**Requisite Course Objectives**

MATH 060-Apply the basic operations to solve application problems that involve whole numbers, integers, and rational numbers.

MATH 065-Apply the basic operations to solve application problems that involve integer numbers, decimals, mixed numbers and rational numbers.

MATH 065-Use concepts and formulas from geometry.

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**Entrance Skills**

Apply the order of operations to simplify expressions involving several operations using rational numbers.

**Requisite Course Objectives**

MATH 060-Apply the order of operations to simplify expressions involving several operations using rational numbers.

MATH 065-Compute using the four basic operations of addition, subtraction, multiplication, and division on the rational numbers in both fraction and mixed number forms.

MATH 065-Apply the order of operations to simplify expressions involving several operations using rational numbers, mixed numbers and decimals.

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**Entrance Skills**

Use rounding and estimation to solve problems involving rational numbers.

**Requisite Course Objectives**

MATH 060-Use rounding and estimation to solve problems involving rational numbers.

MATH 065-Use rounding and estimation to solve problems involving rational numbers, mixed numbers and decimals.

MATH 065-Employ decimal notation and place value to compare, order, and round numbers.

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**Entrance Skills**

Employ decimal notation and place value to compare, order, and round numbers.

**Requisite Course Objectives**

MATH 060-Employ decimal notation and place value to compare, order, and round numbers.

MATH 065-Use rounding and estimation to solve problems involving rational numbers, mixed numbers and decimals.

MATH 065-Employ decimal notation and place value to compare, order, and round numbers.

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**Entrance Skills**

Use the concept of ratio to determine the solution to a proportion problem.

**Requisite Course Objectives**

ENG 061-Demonstrate a basic understanding of research-based writing, including the use of library resources to identify research sources.

MATH 060-Use the concept of ratio to determine the solution to a proportion problem.

MATH 065-Use the concept of ratio or rate involving both rational numbers, mixed numbers and decimals to determine the solution to a proportion problem.

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**Entrance Skills**

Write values as percents, decimals, and fractions and convert any one to any other.

**Requisite Course Objectives**

MATH 060-Apply methods of conversion between percents, decimals, and fractions.

MATH 065- Apply methods of conversion between percents, decimals, and fractions.

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**Entrance Skills**

Solve equations involving percents by applying properties of equality and deductive reasoning.

**Requisite Course Objectives**

MATH 060-Determine the solution to equations involving percents by deductive reasoning.

MATH 065- Determine the solution to equations involving percents by deductive reasoning.

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**Entrance Skills**

Recognize and convert between units of measurements in the American and metric systems.

**Requisite Course Objectives**

MATH 060-Recognize and convert between units of measurements in the American and metric systems.

MATH 065- Recognize and convert between units of measurements in the American and metric systems involving rational numbers, mixed numbers and decimals using conversion factors or proportions.

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**Entrance Skills**

Use unit measure appropriately in applications.

**Requisite Course Objectives**

MATH 060-Use unit measure appropriately in applications.

MATH 065- Recognize and convert between units of measurements in the American and metric systems involving rational numbers, mixed numbers and decimals using conversion factors or proportions.

MATH 065-Use unit measure appropriately in applications involving rational numbers, mixed numbers and decimals.

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**Entrance Skills**

Apply geometric concepts and formulas solve problems involving geometric figures.

**Requisite Course Objectives**

MATH 060-Use concepts and formulas from geometry.

MATH 065-Use concepts and formulas from geometry.

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**Entrance Skills**

Calculate square roots of perfect square natural numbers, estimate square roots of other positive real numbers, and use the Pythagorean Theorem to find missing side lengths of right triangles.

**Requisite Course Objectives**

MATH 060-Compute square roots and use the Pythagorean Theorem to solve simple right triangles.

MATH 065-Compute square roots of natural numbers, fractions and decimals; and use the Pythagorean Theorem to solve simple right triangle problems.

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**Entrance Skills**

Plot rational numbers on a real number line.

**Requisite Course Objectives**

MATH 060-Locate rational numbers on the real number line.

MATH 065-Locate integer numbers, rational numbers, mixed numbers and decimals on the real number line.

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**Entrance Skills**

Understand the concept of a variable and how a variable can be used to represent an unknown quantity.

**Requisite Course Objectives**

MATH 060-Understand the concept of a variable and how a variable can be used to represent an unknown quantity.  
MATH 065-Understand the concept of a variable and how a variable can be used to represent an unknown quantity.

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**Entrance Skills**

Categorize values as natural numbers, whole numbers, integers, and/or rational numbers.

**Requisite Course Objectives**

MATH 060-Distinguish between various subsets of the rational numbers including natural numbers, whole numbers, and integers.  
MATH 065- Distinguish between various subsets of the rational numbers including natural numbers, whole numbers, and integers.

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**Entrance Skills**

Apply the commutative, associative, distributive, inverse, and identity properties to simplify algebraic expressions with rational coefficients and constants.

**Requisite Course Objectives**

MATH 060-Apply the commutative, associative, distributive, inverse and identity properties to simplify algebraic expressions.  
MATH 065-Compute using the four basic operations of addition, subtraction, multiplication, and division on the rational numbers in both fraction and mixed number forms.  
MATH 065-Apply the order of operations to simplify expressions involving several operations using rational numbers, mixed numbers and decimals.  
MATH 065-Apply the commutative, associative, distributive, inverse and identity properties to simplify algebraic expressions involving fraction, mixed number and decimal coefficients.

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**Entrance Skills**

Simplify algebraic expressions involving variables and/or constants raised to natural number exponents.

**Requisite Course Objectives**

MATH 060-Use the properties of natural number exponents to simplify algebraic expressions.  
MATH 065-Use the properties of natural number exponents to simplify algebraic expressions.

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**Entrance Skills**

Verify a rational number is a solution to an equation or show a rational number is not a solution to an equation by evaluating the expressions on both sides of the equation at the given value and checking for equality.

**Requisite Course Objectives**

MATH 060-Evaluate an algebraic expression via substitution of rational numbers and determine if a given value is a solution to an algebraic equation  
MATH 065-Evaluate an algebraic expression via substitution of rational numbers, mixed number and decimals; and determine if a given value is a solution to an algebraic equation.

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**Entrance Skills**

Identify and describe terms, factors, variables, and coefficients in algebraic expressions and equations.

**Requisite Course Objectives**

MATH 060-Explain the concepts of terms, factors, variable and coefficient.  
MATH 065-Explain the concepts of terms, factors, variable and coefficient.

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**Course Content**

1. Review of the development of the real number system
  - a. integers
  - b. rational
  - c. irrational numbers
2. Review of the properties of real numbers and operations

- a. commutative properties of addition and multiplication
  - b. associative properties of addition and multiplication
  - c. distributive property
  - d. identity properties of 0 (addition) and 1 (multiplication)
  - e. inverse properties of addition and multiplication
3. The concept of a variable
  4. Arithmetic of algebraic expressions
    - a. the application of the commutative, associative, distributive, identity, and inverse properties to simplify expressions
    - b. the application of the order of operations to simplify algebraic expressions
    - c. the applications of properties of exponents to simplify algebraic expressions involving integer exponents
  5. Using variables to create algebraic expressions modeling an application problem
  6. Converting numbers between scientific notation and standard notation
  7. Solving linear equations in one variable
    - a. addition & subtraction property of equality
    - b. multiplication & division property of equality
  8. Creating equations that model situations described in application problems
  9. Solving linear inequalities in one variable
    - a. addition & subtraction property of inequality
    - b. multiplication & division property of inequality
  10. Creating inequalities that model situations described in application problems
  11. Graphing solutions of linear equations and linear inequalities in one variable on a real number line
  12. Polynomial arithmetic
    - a. combining like terms
    - b. adding and subtracting polynomials
    - c. using the distributive property to multiply polynomials
    - d. dividing polynomials by monomials
    - e. dividing polynomials by polynomials using polynomial long division
  13. Factoring out the greatest common factor from a polynomial expression
  14. Factoring simple quadratic polynomials
    - a. factoring polynomials with four terms by grouping
    - b. factoring polynomials of the form  $x^2+bx+c$  or  $x^2+bxy+cy^2$  by analyzing b and c and making educated guesses and checking
    - c. identifying prime polynomials of the form  $x^2+bx+c$  or  $x^2+bxy+cy^2$  by analyzing b and c and making educated guesses and checking
    - d. factoring polynomials of the form  $ax^2+bx+c$  by factoring out the GCF of the coefficients
    - e. factoring polynomials of the form  $ax^2+bx+c$  by analyzing b and c and making educated guesses and checking
  15. Solving rational equations that reduce to linear equations
  16. Discussing roots and radicals
    - a. comparing square roots and radicals
    - b. evaluating and simplifying radical expressions
    - c. solving simple radical equations
  17. Analyzing linear equations in two variables
    - a. Verifying solutions
    - b. Describing solution sets
    - c. solving for one variable
    - d. graphing the solution sets in a Cartesian plane
    - e. the slope formula of a line
    - f. the standard form ( $Ax + By = C$ ) for the equation of a line in a plane
    - g. the point-slope form for the equation of a line in a plane
    - h. the slope-intercept form for the equation of a line in a plane and its uniqueness

### Lab Content

1. Discussion among instructor, ISA, and students of lectured material through question and answer format to improve understanding of new concepts
2. Completion of problem sets done on paper or using web-based courseware done individually or in groups
3. Lab assignments involving explorations of course concepts
4. Academic assistance from the instructor or an ISA on assignments

**Course Objectives**

<b>Objectives</b>	
Objective 1	Identify, recognize, and classify real numbers, as integers, rationals, or irrationals and locate their approximate positions on the real number line.
Objective 2	Describe the concept of variables and express unknown quantities and ranges of quantities with variables.
Objective 3	Apply the commutative, associative, distributive, identity, and inverse properties to simplify algebraic expressions involving polynomial, rational and radical expressions
Objective 4	Evaluate and simplify algebraic expressions using the order of operations and the commutative, associative, distributive, identity, and inverse properties of real numbers.
Objective 5	Use the properties of integer exponents to simplify algebraic expressions, including expressions involving scientific notation.
Objective 6	Analyze the concept of an algebraic equation and demonstrate the meaning of a solution to the equation, including integer, non-integer rational, decimal and radical solutions.
Objective 7	Create and solve algebraic equations or inequalities that model application problems.
Objective 8	Employ properties of equality to solve linear equations in one variable and represent solution sets with appropriate notation.
Objective 9	Employ properties of inequality to solve linear inequalities in one variable and represent solution sets with appropriate notation and graphically.
Objective 10	Interpret the slope of a line as the constant rate of change of the variable on the vertical axis with respect to the change of the variable on the horizontal axis.
Objective 11	Use point-slope and slope-intercept forms of lines to graph linear equations in two variables.
Objective 12	Construct linear equations in two variables of lines given the graph, two points, or a point and the slope using the point-slope and/or slope-intercept form of the equation of a line.
Objective 13	Solve systems of two linear equations in two variables both algebraically (substitution and elimination/addition) and graphically.
Objective 14	Add, subtract, multiply, divide, and simplify polynomials.
Objective 15	Factor the greatest common factor from a polynomial expression.
Objective 16	Factor quadratic binomials and trinomials with integer coefficients.
Objective 17	Solve quadratic equations in one variable by factoring and applying the zero product property.
Objective 18	Use the method of completing the square to solve quadratic equations with integer coefficients.
Objective 19	Add, subtract, multiply, divide, and simplify rational expressions.
Objective 20	Solve rational equations that simplify to linear or quadratic equations.
Objective 21	Interpret square roots and solve radical equations.
Objective 22	Deduce right triangle side lengths using the Pythagorean Theorem and radicals.
Objective 23	Use proportionality to discover side lengths of similar triangles.
Objective 24	Use basic formulas from geometry to calculate perimeter, area, and volume of basic figures.
Objective 25	Apply learned principles and skills to novel situations in addition to situations that mimic those on the homework and those shown in class.
Objective 26	Use mathematical language to communicate ideas, especially in writing.

**Student Learning Outcomes**

<b>Upon satisfactory completion of this course, students will be able to:</b>	
Outcome 1	Define and use variables to create linear expressions and equations to model change and patterns in a variety of applications.
Outcome 2	Use the information obtained in application problems to estimate a reasonable solution, identify and execute methods of solution that involve algebraic computations, and evaluate the reasonableness of results.
Outcome 3	Apply algebraic principles and deductive reasoning to solve linear equations and inequalities and represent solution sets using number lines and Cartesian planes.
Outcome 4	Apply algebraic principles and deductive reasoning to solve quadratic equations.



**Methods of Instruction**

Method	Please provide a description or examples of how each instructional method will be used in this course.
Lecture	Professor will present and explain course topics.
Laboratory	Students will participate in individual and group exploration of course topics. Professor and students will discuss and group exploration of course topics.
Discussion	Students and the professor will discuss course topics and evaluate each others' explanations and solutions.
Technology-based instruction	Students will submit answers to problem sets and receive feedback (automated and/or from professor) on assignments.
Technology-based instruction	Students will read, watch, and/or listen to material presented and explained through various media.

**Methods of Evaluation**

Method	Please provide a description or examples of how each evaluation method will be used in this course.	Type of Assignment
Mid-term and final evaluations	Unit tests and final examinations will consist of problems that require students to show work and interpret answers. These examinations will include problems that apply studied principles to new situations in addition to problems similar to those given in homework or completed in class. Preparing for exams may require 1-2 hours of study per week. These examinations may have take-home components.	In and Out of Class
Written homework	Students will complete homework assignments consisting of exercises that range in challenge level. They will receive feedback on their answers and explanations. This will typically require 2-3 hours per week. These assignments may be done on paper or via an online program.	Out of Class Only
Student participation/contribution	Students will participate in discussions and lab activities that require them to apply material learned in class and previous assignments. These assignments may be individual and/or group activities. Students may be required to turn in summaries of their work in addition to write-ups of the problems they solved and questions they answered. They will receive feedback on their answers and explanations from the professor.	In Class Only
Computational/problem-solving evaluations	Students will solve problems that require the applications of concepts learned in lecture and lab assignments (see Student participation/contribution). They will receive feedback on their answers and explanations from the professor. This will typically require 2-3 hours per week. These assignments may be done on paper or via an online program.	In and Out of Class
Tests/Quizzes/Examinations	Students may take short quizzes for grade and/or for self- evaluation purposes. These quizzes may be done on paper or via an online program.	In and Out of Class

**Assignments**
**Other In-class Assignments**

1. Students will attend classroom lectures, watch assigned lecture videos, and complete assigned reading or explorations and take notes on the material covered.
2. Students will participate in classroom discussions to review, analyze, and evaluate various methods of solution used in homework assignments. These discussions may be done in-person, synchronously online, or asynchronously online.

3. Students will complete laboratory assignments using appropriate mathematical tools. These assignments may be individual and/or group activities and may be done in a face-to-face or online setting.

#### **Other Out-of-class Assignments**

1. Students will complete assigned homework and other assignments that involve problem-solving, writing up solutions to exercises that improve skills and mathematical understanding, and other forms of mathematical practice.
2. Students will read textbooks, watch videos, and complete other supplementary research assignments.

#### **Grade Methods**

Letter Grade Only

#### **Distance Education Checklist**

**Include the percentage of online and on-campus instruction you anticipate.**

**Online %**

100

**On-campus %**

0

**What will you be doing in the face-to-face sections of your course that necessitates a hybrid delivery vs a fully online delivery?**

Although the course can be offered entirely online, it may also be offered hybrid to take advantage of collaboration activities that are more suited to in-person interaction.

Examinations can be given in a controlled location.

#### **Lab Courses**

**How will the lab component of your course be differentiated from the lecture component of the course?**

Lab assignments involve more interaction. For example, they may require students collaborate with a classmate, utilize a tutoring resource, or interview someone who is not part of the course.

**From the COR list, what activities are specified as lab, and how will those be monitored by the instructor?**

Lab activities are discussions and assignments that involve solving problems or exploring concepts with other students, with people not part of the course, or under the guidance of the professor or instructional support assistant. Discussions and other assignments that are completed in Canvas are monitored and evaluated by the professor. Assignments that do not take place in Canvas are evaluated by the professor based on write-ups (which may include summaries and feedback from the participants). Anonymous and non-anonymous feedback opportunities will be available to students to allow the professor further monitor effectiveness and appropriateness of activities that take place somewhere other than on the course LMS.

**How will you assess the online delivery of lab activities?**

Reports and other forms of write-ups will be submitted on the course LMS for evaluation and feedback.

#### **Instructional Materials and Resources**

**If you use any other technologies in addition to the college LMS, what other technologies will you use and how are you ensuring student data security?**

Depending on the textbook used, the professor may choose to use Pearson MyLab and Mastering, WebAssign, or MyOpenMath. All of these are considered to be safe for use in education for both faculty and students. All can also be integrated with the college LMS (Canvas), which decreases the amount of times students will need to sign-in-and-out of accounts and open them up to data breaches.

**If used, explain how specific materials and resources outside the LMS will be used to enhance student learning.**

Professors who choose to use Pearson MyLab and Mastering, WebAssign, or MyOpenMath do so in order to assign pre-written or instructor-created problems that are more complicated than those that can be created in Canvas while still receiving instantaneous feedback.

#### **Effective Student/Faculty Contact**

**Which of the following methods of regular, timely, and effective student/faculty contact will be used in this course?**

**Within Course Management System:**

Discussion forums with substantive instructor participation  
Online quizzes and examinations

Private messages  
Regular virtual office hours  
Timely feedback and return of student work as specified in the syllabus  
Weekly announcements

**External to Course Management System:**

Direct e-mail  
Posted audio/video (including YouTube, 3cm mediasolutions, etc.)  
Synchronous audio/video  
Telephone contact/voicemail

**For hybrid courses:**

Scheduled Face-to-Face group or individual meetings

**Briefly discuss how the selected strategies above will be used to maintain Regular Effective Contact in the course.**

Faculty will regularly contact students individually and as a group through Canvas messages and/or COD email. Students will also receive regular announcements with information about the course, COD as a whole, or other relevant information.

In discussions and through other lab assignments, students will communicate with each other and their professor regularly and frequently.

**If interacting with students outside the LMS, explain how additional interactions with students outside the LMS will enhance student learning.**

Students may prefer to contact their professor via email or on the phone, which allows for an improved experience for those who communicate better in those contexts. The professor may direct students to access free supplemental resources as well.

**Other Information****MIS Course Data****CIP Code**

27.0101 - Mathematics, General.

**TOP Code**

170100 - Mathematics, General

**SAM Code**

E - Non-Occupational

**Basic Skills Status**

Basic Skills

**Prior College Level**

Two levels below transfer

**Cooperative Work Experience**

Not a Coop Course

**Course Classification Status**

Credit Course

**Approved Special Class**

Not special class

**Noncredit Category**

Not Applicable, Credit Course

**Funding Agency Category**

Not Applicable

**Program Status**

Stand-alone

**Transfer Status**

Not transferable

**General Education Status**

Y = Not applicable

**Support Course Status**

N = Course is not a support course

**Allow Audit**

No

**Repeatability**

No

**Materials Fee**

No

**Additional Fees?**

No

**Approvals****Curriculum Committee Approval Date**

11/18/2021

**Academic Senate Approval Date**

12/09/2021

**Board of Trustees Approval Date**

01/21/2022

**Chancellor's Office Approval Date**

03/11/2022

**Course Control Number**

CCC000082785