

**MATH 154 Course Outline as of Fall 2024****CATALOG INFORMATION**

Dept and Nbr: MATH 154      Title: ELEM AND INT ALG B-STEM  
 Full Title: Elementary and Intermediate Algebra For Business and STEM  
 Last Reviewed: 10/22/2018

| Units   | Course Hours per Week |                   | Nbr of Weeks |      | Course Hours Total |        |
|---------|-----------------------|-------------------|--------------|------|--------------------|--------|
| Maximum | 8.00                  | Lecture Scheduled | 8.00         | 17.5 | Lecture Scheduled  | 140.00 |
| Minimum | 8.00                  | Lab Scheduled     | 0            | 17.5 | Lab Scheduled      | 0      |
|         |                       | Contact DHR       | 0            |      | Contact DHR        | 0      |
|         |                       | Contact Total     | 8.00         |      | Contact Total      | 140.00 |
|         |                       | Non-contact DHR   | 0            |      | Non-contact DHR    | 0      |

Total Out of Class Hours: 280.00

Total Student Learning Hours: 420.00

Title 5 Category: AA Degree Applicable

Grading: Grade or P/NP

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

**Catalog Description:**

A combined elementary and intermediate algebra course that incorporates the use of graphing technology. Topics include functions, equations and inequalities in one variable, systems of linear equations in two and three variables, exponential and logarithmic functions and equations, and conic sections.

**Prerequisites/Corequisites:**

Completion of CSKLS 373 or CSKLS 372 or AB705 placement into <https://assessment.santarosa.edu/understanding-your-math-placement> Math Tier 1 or higher

**Recommended Preparation:****Limits on Enrollment:****Schedule of Classes Information:**

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equations, and conic sections. (Grade or P/NP)

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Recommended:

Limits on Enrollment:

Transfer Credit:

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

|                      |                      |                                       |           |
|----------------------|----------------------|---------------------------------------|-----------|
| <b>AS Degree:</b>    | <b>Area</b>          | Effective:                            | Inactive: |
|                      | B                    | Fall 2016                             |           |
|                      |                      | Communication and Analytical Thinking |           |
|                      | MC                   | Math Competency                       |           |
| <b>CSU GE:</b>       | <b>Transfer Area</b> | Effective:                            | Inactive: |
| <b>IGETC:</b>        | <b>Transfer Area</b> | Effective:                            | Inactive: |
| <b>CSU Transfer:</b> |                      | Effective:                            | Inactive: |
| <b>UC Transfer:</b>  |                      | Effective:                            | Inactive: |

**CID:**

**Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

**Student Learning Outcomes:**

At the conclusion of this course, the student should be able to:

1. Solve linear equations, linear inequalities in one variable, polynomial equations by factoring, radical equations, and systems of two linear equations.
2. Simplify and perform operations on expressions involving radicals, exponents, and polynomials.
3. Graph and formulate linear equations in two variables.
4. Identify and use appropriate algebraic methods to solve application problems.
5. Analyze functions and solve equations and inequalities using graphing technology and algebraic methods.
6. Create mathematical models and solve applications of linear and nonlinear functions.
7. Solve systems of linear equations using matrix methods and graphing technology.
8. Graph conic sections, including parabolas, ellipses, and hyperbolas.

**Objectives:**

At the conclusion of this course, the student should be able to:

1. Solve linear equations and inequalities in one variable.
2. Evaluate and solve formulas.
3. Graph linear equations and inequalities in two variables, including the slope-intercept method.
4. Find the equation of a line given information about the line.
5. Define a polynomial, and perform the operations of addition, subtraction, multiplication,

- division, and factoring of polynomials.
6. Use the laws of exponents and manipulate expressions involving rational exponents.
  7. Solve linear systems of equations in two variables using the methods of substitution, addition, and graphing.
  8. Simplify, add, subtract, multiply and divide radical expressions.
  9. Simplify, add, subtract, multiply, and divide rational expressions.
  10. Define function, domain, and range, and use function notation.
  11. Identify basic features of the graphs of polynomial, radical, absolute value, exponential and logarithmic functions.
  12. Use graphing technology to construct graphs, to solve nonlinear equations and inequalities in one variable, and to locate roots, intersection points, and extrema.
  13. Use algebraic methods to solve equations that involve polynomial, radical, absolute value, rational, exponential and logarithmic expressions.
  14. Find algebraic solutions to literal equations.
  15. Apply algebraic or graphical methods, as appropriate, to solve application problems involving polynomial, radical, absolute value, rational, exponential and logarithmic functions.
  16. Apply properties of exponents and logarithms.
  17. Express an understanding of the number  $e$ .
  18. Graph conic sections, including parabolas, ellipses, and hyperbolas.
  19. Use algebraic and graphical methods to solve linear and nonlinear systems in two variables, and use Reduced Row Echelon Form (RREF) to solve systems of linear equations in three variables.
  20. Solve application and modeling problems that require the use of a system of linear equations.
  21. Find graphical solutions to systems of linear inequalities.

## Topics and Scope:

### I. Linear Equations and Inequalities in One Variable

- A. Linear equations
- B. Applications of linear equations
- C. Linear inequalities
- D. Formulas

### II. Linear Equations and Inequalities in Two Variables

- A. Cartesian coordinate system
- B. Graphing linear equations, including the slope-intercept method
- C. Finding the equation of a line
- D. Graphing linear inequalities in two variables
- E. Systems of equations in two variables
  1. Solving by graphing
  2. Solving by elimination (addition)
  3. Solving by substitution
  4. Applications

### III. Integer Exponents and Laws of Exponents

### IV. Polynomials

- A. Definition
- B. Operations
- C. Factoring
  1. Common factors
  2. Grouping
  3. Trinomials
  4. Difference of squares

- 5. Sum and difference of cubes
- D. Solving quadratic equations by factoring
- E. Applications
- V. Radicals
  - A. Square roots
  - B. Simplification
  - C. Sums and products of radicals
  - D. Rationalizing denominators of square roots
  - E. Higher-index radicals
  - F. Pythagorean Theorem
  - G. Radical equations
  - H. Rational exponents
  - I. Applications
- VI. Use of Technology
  - A. Evaluate and graph functions
  - B. Solve equations and inequalities graphically
  - C. Matrices and RREF
- VII. Functions
  - A. Definition of relation, function, domain, and range
  - B. Function notation and evaluation
  - C. Interval notation, intersection and union
  - D. Analyze graphs of polynomial, absolute value, radical, exponential, and logarithmic functions with and without graphing technology
  - E. Mathematical models and other applications of linear and nonlinear functions
- VIII. Equations and Inequalities
  - A. Equations
    - 1. Solutions of literal equations
    - 2. Algebraic and graphical solutions of linear, quadratic, radical, rational, absolute value, exponential, and logarithmic equations
  - B. Inequalities
    - 1. Algebraic solutions to absolute value inequalities
    - 2. Graphical solutions of linear and nonlinear inequalities using graphing technology
- IX. Quadratic Functions
  - A. Vertex and general forms
  - B. Discriminant
  - C. Solutions to quadratic equations using factoring, quadratic formula, and completing the square
  - D. Applications and modeling
- X. Rational Expressions and Equations
  - A. Simplification of rational expressions, including complex fractions
  - B. Operations on rational expressions
  - C. Solving rational equations
  - D. Applications and modeling
- XI. Exponential and Logarithmic Functions
  - A. The number  $e$
  - B. Common and natural logarithms
  - C. Laws of logarithms
  - D. Applications and modeling
- XII. Introduction to Conic Sections
  - A. Midpoint and Distance Formulas, Circles
  - B. Parabolas
  - C. Ellipses

- D. Hyperbolas
- XIII. Systems of Equations/Inequalities
  - A. Linear and nonlinear systems of equations
  - B. Matrices and RREF
  - C. Systems of linear inequalities
  - D. Applications and modeling

**Assignment:**

1. Reading outside of class (0-60 pages per week)
2. Problem sets (1-8 per week)
3. Quizzes (0-4 per week)
4. Projects (0-10)
5. Exams (3-8)
6. Final exam

**Methods of Evaluation/Basis of Grade:**

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments are more appropriate for this course.

Writing  
0 - 0%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Problem sets

Problem solving  
5 - 20%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None

Skill Demonstrations  
0 - 0%

**Exams:** All forms of formal testing, other than skill performance exams.

Exams and quizzes

Exams  
70 - 95%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

Projects

Other Category  
0 - 10%

**Representative Textbooks and Materials:**

Beginning and Intermediate Algebra. 5th ed. Miller, Julie and O'Neill, Molly and Hyde, Nancy. McGraw-Hill. 2017

