EL CAMINO COLLEGE
COURSE OUTLINE OF RECORD

I. COURSE DESCRIPTION

Course Title and Number: Mathematics 80

Descriptive Title: Intermediate Algebra for Science, Technology, Engineering, and Mathematics

Discipline: Mathematics

Division: Mathematical Sciences

Course Length: ☒Full Term ☐Other (specify):

Hours Lecture: 5 Hours Laboratory: _____ Course Units: 5

Grading Method: ☒Letter ☐Credit/No Credit ☐Both ☐No Grade

Course Type: ☒Credit, Degree Applicable ☐Credit, Not Degree Applicable ☐Non-Credit

Transfer CSU: ☐Yes Effective Date _____ ☒No

Transfer UC: ☐Yes Approval Date _____ ☐Pending ☒No

Conditions of Enrollment:
Specify Prerequisite Corequisite, Recommended Preparation, Enrollment Limitation or None.

Prerequisite: Mathematics 40 or Mathematics 41B with a minimum grade of C in prerequisite or qualification by testing (El Camino College Mathematics Placement Test) and assessment

Catalog Description:

This intermediate algebra course is designed for students who are considering further study in the sciences, technology, engineering, or mathematics. In the context of studying a large library of basic functions and their graphs, students strengthen and expand their algebra skills. The library includes linear, quadratic, polynomial, rational, radical, exponential, and logarithmic functions, as well as inverse functions and the absolute value function. Particular emphasis is placed on the operations on functions, as well as solving equations and inequalities. Other topics include solving systems of equations, operations on complex numbers, and applications.

Note: Mathematics 80 serves as a prerequisite course for all transfer-level mathematics course sequences, INCLUDING the calculus sequence (Mathematics 170, 180, 190, 191 and 220). This intermediate algebra course satisfies the Associate of Arts and Associate of Science general education mathematics competency requirement.

II. COURSE OBJECTIVES

List the major objectives of the course. These must be stated in behaviorally measurable terms.

1. Carry out numerical operations and manipulate algebraic expressions, including expressions with rational and negative exponents, complex numbers, and logarithms.

2. Recognize functional relationships in the form of graphs, data or symbolic equations.

3. Solve problems involving a variety of function types, including linear, quadratic, polynomial, rational, radical, exponential, and logarithmic functions.

4. Graph a variety of functions and relations and draw connections between these graphs and solutions to problems.

5. Solve a variety of equations and inequalities, as well as systems of equations and inequalities, using algebraic and graphical methods. Types of equations include linear, quadratic, polynomial, rational, radical, exponential and logarithmic equations.

6. Using numerical, symbolic and graphical methods, model application problems, solve them and interpret the results in the context of the problem.

III. OUTLINE OF SUBJECT MATTER

The topics should be detailed enough to enable an instructor to determine the major areas that should be covered and so that the course may have consistency from instructor to instructor and semester to semester.

Approximate Time in Hours	Major Topics
13	Basic Operations and Manipulations:

- Review of operations on polynomial, rational and radical expressions
- Operations on exponential and logarithmic expressions, power expressions with negative or rational exponents, as well as absolute value expressions
- Factoring polynomial expressions
- Rewriting radical expressions as expressions with rational exponents
- Properties of exponential and logarithmic expressions
- Conversion between logarithmic and exponential statements
- Operations on complex numbers

18 Functions:

- Definitions of function, domain and range
- Function notation
- Functions as rules, as sets of ordered pairs, as algebraic equations, and as graphs. Function types include polynomial, power, rational, radical, exponential, logarithmic and the absolute value
- Operations on functions, including addition, subtraction, multiplication, division, exponentiation and composition
- One-to-one functions
- Inverse functions
- Determining the equation for a linear function given the graph or sufficient data

19 Graphing:

- Graphing functions of all types, especially the basic functions
  $f(x) = x, x^2, x^3, \sqrt{x}, |x|, \frac{1}{x}, a^x, \log_a(x)$.
- Graphing solutions to equations and inequalities
- Graphing basic conic sections

- Graphing quadratic functions using the completing-the-square technique to identify the vertex of a parabola
- Transformations of graphs of functions, including translations, reflections and rescalings

21 Equations and Inequalities:

- Algebraic and graphical methods for solving equations and inequalities
- Techniques for solving quadratic equations over the complex numbers
- Techniques for solving quadratic inequalities over the real numbers
- Techniques for solving other equations and inequalities, which contain polynomial, rational, radical, exponential and logarithmic expressions, as well as the absolute value of linear expressions.
- Finding domains of radical, rational and logarithmic functions by setting up and solving appropriate inequalities.
- Using interval notation to express solutions of inequalities
- Operations on sets: unions and intersections
- Systems of linear equations (2 x 2 systems and 3 x 3 systems)

19 Applications

- Modeling verbally expressed problems numerically, symbolically and graphically
- Solving problems numerically, symbolically and graphically
- Pattern recognition strategies
- Perimeter and area of rectangles, triangles and circles
- Pythagorean Theorem
- Rate, distance and time problems
- Exponential growth and decay problems
- Other applied problems whose solutions utilize the function types listed above, as well as the types of equations and inequalities listed above
- Applied problems whose solutions require the use of systems of linear equations

Total: 90 hours

IV . METHODS OF EVALUATION

A. CREDIT, DEGREE APPLICABLE AND CREDIT, NOT DEGREE APPLICABLE COURSES

Check the PRIMARY method of evaluation for this course.

☐ Substantial writing assignments
☒ Problem solving demonstrations (computational or non-computational)
☐ Skills demonstrations

A minimum of one response in the categories 1, 2, or 3 below, as applicable, is required. However, you may check all that apply.

1. Indicate the types of writing assignments used as primary or secondary methods of evaluation for this course.

- ☐ Essay exams
- ☐ Written homework
- ☐ Term or other papers
- ☐ Reading reports
- ☐ Laboratory reports
- ☐ Other (specify)

2. Indicate the types of problem-solving demonstrations used as primary or secondary methods of evaluation for this course.
   - ☒ Exams
   - ☐ Laboratory reports
   - ☒ Quizzes
   - ☒ Homework problems
   - ☐ Fieldwork
   - ☐ Other (specify)

3. Indicate the types of skill demonstrations used as primary or secondary methods of evaluation for this course.
   - ☐ Class performance
   - ☐ Performance exams
   - ☐ Fieldwork
   - ☐ Other (specify)

4. If objective exams are also used, check all that apply.
   - ☐ Multiple choice
   - ☐ Completion
   - ☐ Matching items
   - ☐ True/false
   - ☐ Other (specify)

B. NON-CREDIT COURSE

Indicate the methods of evaluation that will be used to determine that stated objectives have been met.

V. COURSEWORK

A. TYPICAL ASSIGNMENT

Provide an example of a typical assignment. This assignment must correspond to the PRIMARY method of evaluation indicated in Section IV, Methods of Evaluation. That is, it must be a writing assignment or, if more appropriate, an assignment involving problem solving or skill demonstration.

Solve the inequality $\frac{2x-3}{4-x} > 2$, check your work and present the solution in interval notation. Also, graph the solution on a number line and on the x-y coordinate plane.

B. COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS

Cite two specific assignments that demonstrate college-level critical thinking. (Required for degree applicable courses only.)

1. The price of computer technology has been dropping steadily for the past ten years. If a certain computer cost $6700 ten years ago and a computer with the same level of computing power cost $2200 three years ago, find the rate of decrease in cost of this level of computing power per year. Predict what this level of computing power would cost today. Why will this model stop making sense at some point in time? Show all of your work.

2. The population of the world in 1960 was about four billion human beings. If the population is growing according to the Malthusian model with an annual growth rate of 1.8%, what does this model predict the population of the world to be in the year 2000? Find the actual world population

in the year 2000. Compare your answer with the actual world population in the year 2000. What does this tell you about the Malthusian model? Write a paragraph explaining your reasoning.

C. WORK OUTSIDE OF CLASS

Two hours work outside of class are required for each hour of lecture or equivalent. Each student in this course will be required to participate in the following work outside of class time. Check all that apply.

- ☒ Study
- ☐ Answer questions
- ☐ Skill practice
- ☒ Required reading
- ☒ Problem solving activity
- ☐ Written work (such as essay/composition/report/analysis/research)
- ☐ Journal (done on a continuing basis throughout the semester)
- ☐ Observation of or participation in an activity related to course content (such as a theatre event, museum, concert, debate, meeting)
- ☐ Course is lab only - minimum required hours satisfied by scheduled lab time
- ☐ Other (specify)

VI. INSTRUCTIONAL METHODOLOGY

A. Check all planned instructional activities that apply:

☒ Lecture	☐ Group Activities
☐ Lab	☐ Role play/simulation
☐ Discussion	☐ Guest Speakers
☐ Multimedia presentations	☐ Field trips
☐ Demonstration	☐ Other (specify)

Note: In compliance with Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973, and Sections 504 and 508 of the Americans with Disabilities Act, instructional delivery shall provide access, full inclusion, and effective communication for students with disabilities.

VII. TEXTS AND MATERIALS

If multiple selection is offered, only representative texts need be listed. An up-to-date list of required and recommended materials is maintained in the division office.

A. REQUIRED TEXTS (title, author, publisher, year)

Intermediate Algebra, 3rd Edition, A. Tussy and R. Gustafson, Brooks/Cole, 2005

B. REQUIRED SUPPLEMENTARY READINGS

C. OTHER REQUIRED MATERIALS

VIII. CONDITIONS OF ENROLLMENT

If this course has a Prerequisite or Corequisite, complete section A. If this course has an Enrollment Limitation complete section B.

A. PREREQUISITE AND/OR COREQUISITE

1. Indicate if this course has a prerequisite or corequisite or both.

   ☒ Prerequisite ☐ Corequisite ☐ Both

2. Indicate Type. Check all that apply.

☒Sequential ☐Computational/Communication Skills
☐Health and Safety ☐Non-Course
☐Standard (If this is a Standard prerequisite or corequisite, attach CCC Form D.)

3. Entrance Skills/Knowledge
List the required skills and/or knowledge without which a student would be highly unlikely to receive a grade of A, B, C, or Credit (or for Health and Safety, would endanger self or others) in this course.
    1. Manipulate algebraic expressions, including expressions with fractions and radicals.
    2. Solve quadratic equations and systems of linear equations.
    3. Graph systems of linear equations.
    4. Solve application problems using linear and quadratic equations.

B. ENROLLMENT LIMITATION

1. Indicate the category which describes the Enrollment Limitation for this course.
☐Band/Orchestra
☐Theater
☐Speech
☐Chorus
☐Journalism
☐Dance
☐Intercollegiate Athletics
☐Honors Course
☐Blocks of Courses
☐Other (specify)

2. List Degree and/or Certificate requirements that are met by this course.
3. List all El Camino College courses that also satisfy the requirements listed above in Section B.2.

Originator: Amy Muneoka Submittal Date: Spring 1977

BOARD APPROVAL DATE: _____

Reviewed and/or Revised by:

Marc Glucksman Date: October, 1987

Susan Taylor Date: October, 1998

Linda Ho Date: November, 2001

Robert Lewis Date: May, 2007

REQUIRED SIGNATURES FOR NON-CREDIT COURSE

College Curriculum Committee Chair

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CCC Form 1, 5/2006