Proposal for Course Revisions
Fall 2018

Subject and Number: Mathematics 80

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

Course Discipline(s): Mathematics

Division: Mathematical Sciences

Department: Mathematical Sciences

Faculty Proposer: Eduardo Barajas

Division CCC Rep: Diaa Eldanaf

Division Curriculum Committee Approval Date: Nov. 2017

Course Review Rationale (The standard rationale verbiage is included. Add additional rationale information if needed): This course is being reviewed to meet Title 5 regulations and local standards. Add additional justification as needed: This course is being reviewed to meet Title 5 regulations and local standards and compliance with the 6-year cycle.

☐ **Inactivation**
Justification:
(If this course is being inactivated, stop here. No other parts of the form need to be complete.)

I. Course Name and Number
☒ No changes
☐ Revisions
Justification:

Descriptive Title
☒ No Changes
☐ Revisions
Justification:

Catalog Description
☒ No Changes
☐ Revisions
Justification:

Conditions of Enrollment
☐ No Changes
☒ Revisions (If prerequisite changes are being proposed, contact the Curriculum Advisor.)
Justification: Adding Math 37 passing Levels A, B, and C. Passing Levels A, B, and C in Mathematics 37 (with its 80% minimum standard on all quizzes and exams) is a higher standard than passing Mathematics 40 with a C.

Office Use Only: Course Identifier 20049

II. Student Learning Outcomes (SLOs)
☒ No Changes
☐ Revisions
Justification:

III. Objectives
☐ No Changes
☒ Revisions
Justification: Added a variety of assessment methods.

IV. Major Topics
☒ No Changes
☐ Revisions
Justification:

V. Primary Methods of Evaluation
☒ No Changes
☐ Revisions
Justification:

VI. Instructional Methods
☒ No Changes
☐ Revisions
Justification:

VII. Work Outside of Class
☒ No Changes
☐ Revisions
Justification:

VIII. TEXTS AND MATERIALS
☐ No Changes
☒ Revisions
Justification: Updated textbook to a more recent edition.

IX. Distance Education Addendum

If a Distance Education Addendum exists for this course, you must complete the Distance Education Addendum below. Please refer to CurricUNET version if needed.

Distance Education Version of this Course

Current version ☐ Online ☐ Hybrid
☒ No Changes
☐ Revisions
Justification:

Delivery Method:

☐ Online (Complete Section A)
☐ Hybrid (Complete Section B)

A. Online (51% or more online instruction with an optional or mandatory on-campus orientation.)
Complete this section.

I. **Methods of Regular Effective Contact Between Instructor and Student** (Check all that apply)

A. Group Meetings:

☐Chat Room
☐Interactive Videoconferencing
☐Teleconference
☐On Campus
☐Other(Please specify)

B. Electronic/Technology-Assisted Contact

☐Online
☐Email
☐Listserv
☐Chat Room
☐Interactive Videoconferencing
☐Website/Bulletin Board
☐Telephone
☐U.S. Mail
☐On Camus
☐Other (Please specify)

C. Office Hours

☐Online
☐On Campus

II. **Methods of Evaluation**

☐Methods of Evaluation do NOT differ from those in the Course Outline of Record
☐Methods of Evaluation in the Course Outline of Record are modified or supplemented

III. Administration of Examinations

☐On Campus
☐Online
☐Email
☐U.S. Mail
☐Proctored Off Campus
☐Not applicable
☐Other (Please specify)

IV. Text/Supplemental Readings/Materials

☐Texts, Supplemental Readings, and Materials do NOT differ from those listed in the Course Outline of Record
☐Texts, Supplemental Readings, and Materials differ from those listed in the Course Outline of Record

V. Accommodations for Students with Disabilities and Instructional Delivery

In compliance with ECC Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973 – Sections 504 and 508, and the Americans with Disabilities Act, instructional delivery shall provide access, full inclusion, and effective communication for students with disabilities. Instructional delivery methods may include, but are not limited to, Braille/audiotape for print material, on-site interpreter/real-time transcription/live captioning for audio material, captioning for video material, alternative text for images, and captioning of audio information for electronic media materials (such as web and online).

☐ Instructors of the distance education version of this course will read and will comply with the Accommodations for Students with Disabilities and Instructional Deliver.

B. Hybrid (51% of more online instruction with regularly scheduled mandatory on-campus meetings.) **Complete this section**.

I. Methods of Regular Effective Contact Between Instructor and Student (Check all that apply)

A. Group Meetings:

☐Chat Room
☐Interactive Videoconferencing
☐Teleconferencing
☐On Campus
☐Other (Please specify)

B. Electronic/Technology-Assisted Contact

☐Online
☐Email
☐Listserve
☐Chat Room
☐Interactive Video Conferencing
☐Website/Bulletin Board
☐Telephone
☐U.S. Mail
☐On Campus
☐Other (Please specify)

C. Office Hours

☐Online

☐On Campus

II. Methods of Evaluation

☐Methods of Evaluation do NOT differ from those in the Course Outline of Record

☐Methods of Evaluation in the Course Outline of Record are modified or supplemented

III. Administration of Examinations

☐On Campus

☐Online

☐Email

☐U.S. Mail

☐Proctored Off Campus

☐Not applicable

☐Other (Please specify)

IV. Text/Supplemental Readings/Materials

☐Texts, Supplemental Readings, and Materials do NOT differ from those listed in the Course Outline of Record

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V. Accommodations for Students with Disabilities and Instructional Delivery

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☐Instructors of the distance education version of this course will read and will comply with the Accommodations for Students with Disabilities and Instructional Delivery.

Instructions:
To facilitate course review, please make your changes directly on this document and indicate the changes using strikethroughs (~~strikethroughs~~), highlights, or by changing the color of the font. Please do not use Track Changes.

El Camino College
COURSE OUTLINE OF RECORD - Pending

I. GENERAL COURSE INFORMATION

Subject and Number:	**Mathematics 80**
Descriptive Title:	**Intermediate Algebra for Science, Technology, Engineering, and Mathematics**
Course Disciplines:	**Mathematics**
Division:	**Mathematical Sciences**

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).

Conditions of Enrollment:

Prerequisite: Mathematics 40 with a minimum grade of C or Mathematics 37 with a grade of P and evidence of having passed Levels A, B, and C or qualification by testing (El Camino College Mathematics Placement Test) and assessment

Course Length: X Full Term Other (Specify number of weeks):

Hours Lecture: 5.00 hours per week TBA

Hours Laboratory: 0 hours per week TBA

Course Units: 5.00

Grading Method: Letter

Credit Status: Associate Degree Credit

Transfer CSU: X Effective Date: Proposed

Transfer UC: No

General Education:

El Camino College:

4B – Language and Rationality – Communication and Analytical Thinking

Term: Other:

6 – Mathematics Competency

Term: Other:

CSU GE:

IGETC:

II. OUTCOMES AND OBJECTIVES

A. COURSE STUDENT LEARNING OUTCOMES (The course student learning outcomes are listed below, along with a representative assessment method for each. Student learning outcomes are not subject to review, revision or approval by the College Curriculum Committee)

1. SLO #1 Application Problems: Students will be able to solve application problems involving linear, quadratic, polynomial, rational, radical, exponential and logarithmic functions.

2. SLO #2 Solving Equations and Manipulating Expressions: Students will be able to evaluate numerical operations and manipulate algebraic expressions involving rational and negative exponents, radicals, complex numbers, exponents and logarithms and be able to solve linear, quadratic, polynomial, rational, radical, absolute value, exponential and logarithmic equations and inequalities.

3. SLO #3 Visual and Graphical Methods: Students will be able to use visual and graphical methods to represent, analyze and solve problem involving linear, quadratic, polynomial, rational, absolute value, radical, exponential, logarithmic functions, conic sections, linear and nonlinear systems of equations. Students will also be able to solve such functions and equations using graphical methods.

4. SLO #4 Articulating Mathematical Reasoning: Students will be able to explain verbally, both orally or in writing, and the mathematical reasoning used in an application problem involving linear, quadratic, polynomial, rational, radical, absolute value, exponential and logarithmic equations and inequalities.

The above SLOs were the most recent available SLOs at the time of course review. For the most current SLO statements, visit the El Camino College SLO webpage at http://www.elcamino.edu/academics/slo/.

B. Course Student Learning Objectives (The major learning objective for students enrolled in this course are listed below, along with a representative assessment method for each)

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

Written homework

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

Objective Exams

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

Quizzes

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

Objective Exams

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.

Written homework

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

Objective Exams

III. OUTLINE OF SUBJECT MATTER (Topics are detailed enough to enable a qualified instructor to determine the major areas that should be covered as well as ensure consistency from instructor to instructor and semester to semester.)

Lecture or Lab	Approximate Hours	Topic Number	Major Topic
Lecture	13	I	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
Lecture	18	II	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
Lecture	19	III	GRAPHING: - Graphing functions of all types, especially the basic functions f(x) = x, x2, x3, v x, ¦x¦, 1/x, ax, 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
Lecture	21	IV	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 expression solutions of inequalities - Operations on sets: unions and intersections - Systems of linear equations (2 x 2 systems and 3 x 3 systems)
Lecture	19	V	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 Lecture Hours		90	
Total Laboratory Hours		0	
Total Hours		90	

IV. PRIMARY METHOD OF EVALUATION AND SAMPLE ASSIGNMENTS

A. **PRIMARY METHOD OF EVALUATION:**

Problem solving demonstrations (computational or non-computational)

B. **TYPICAL ASSIGNMENT USING PRIMARY METHOD OF EVALUATION:**

Solve the inequality 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.

C. **COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS:**

0. 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.

1. 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.

D. **OTHER TYPICAL ASSESSMENT AND EVALUATION METHODS:**
Other exams
Quizzes
Homework Problems

V. INSTRUCTIONAL METHODS

Lecture

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, instruction delivery shall provide access, full inclusion, and effective communication for students with disabilities.

VI. WORK OUTSIDE OF CLASS

Study
Required reading
Problem solving activities

Estimated Independent Study Hours per Week: 10

VII. TEXTS AND MATERIALS

A. **UP-TO-DATE REPRESENTATIVE TEXTBOOKS**

Bittinger, Ellenbogen & Johnson. INTERMEDIATE ALGEBRA: Concepts and Applications. 10th ed. Pearson, 2018.

B. **ALTERNATIVE TEXTBOOKS**

C. **REQUIRED SUPPLEMENTARY READINGS**

D. **OTHER REQUIRED MATERIALS**

VIII. CONDITIONS OF ENROLLMENT

A. Requisites (Course and Non-Course Prerequisites and Corequisites)

Requisites	Category and Justification
Course Prerequisite Mathematics-40 or	Sequential
Non-Course Prerequisite or	As our registration system is not able to handle the necessary data (namely that the student has passed Levels A, B, and C), what would normally be a course prerequisite is being listed as a non-course prerequisite. This pathway into Mathematics 80 will not be automated, but will be handled through a clearance process on a one-by-one basis. Passing Levels A, B, and C in Mathematics 37 (with its 80% minimum standard on all quizzes and exams) is a higher standard than passing Mathematics 40 with a C. This prerequisite is sequential. See the Entry Skills for examples that support the claim that without knowledge that can be gained in Levels A, B, and C of Mathematics 37, a student is highly unlikely to succeed in Mathematics 80.
Non-Course Prerequisite	Placement assessment is an officially recognized mechanism for controlling enrollment in developmental mathematics courses. Placement cut scores are periodically reviewed by faculty and adjusted to match success rates in the target courses. Students who do not meet the placement cut score for this class are statistically highly unlikely to succeed.

B. Requisite Skills

Requisite Skills
Manipulate algebraic expressions, including expressions with fractions and radicals. MATH 40 - Use the properties of the real numbers to evaluate, simplify, and factor algebraic expressions, including expressions with fractions and radicals. MATH 37 - Use the order of operations to evaluate expressions that combine the addition, subtraction, multiplication, division and exponentiation of real numbers.

Solve quadratic equations and systems of linear equations. MATH 40 - Set up and solve application problems using linear equations and inequalities, systems of two linear equations with two variables, and quadratic equations. MATH 37 - Represent linear and quadratic models with tables, graphs and equations (coordinate graphing), and transform the model from one representation to another. MATH 37 - Set up, graph, and solve linear equations, systems of linear equations, and linear inequalities using a variety of techniques. MATH 37 - Set up, graph and solve quadratic equations using a variety of methods, including factoring, the square root property, completing the square, and the quadratic formula.

C. Recommended Preparations (Course and Non-Course)

Recommended Preparation	Category and Justification

D. Recommended Skills

Recommended Skills

E. Enrollment Limitations

Enrollment Limitations and Category	Enrollment Limitations Impact

Course created by Amy Muneoka on 02/01/1977. (DO NOT CHANGE)

BOARD APPROVAL DATE: (DO NOT CHANGE)

LAST BOARD APPROVAL DATE: (DO NOT CHANGE)

Last Reviewed and/or Revised by:

Date:

20049