

# El Monte Union High School District

## Course Outline

**District:**EMUHSD  
**High School:** ALL

Title: Pre-Calculus Honors

Transitional\* \_\_\_\_\_ (Eng. Dept. Only)

Sheltered (SDAIE)\* \_\_\_\_\_ Bilingual\* \_\_\_\_\_

AP\*\* \_\_\_\_\_ Honors\*\* X

Department: Mathematics

CTE/VOC ED :

Industry Sector: \_\_\_\_\_

Pathways: \_\_\_\_\_

Check One

Introductory: \_\_\_\_\_

Concentrator: \_\_\_\_\_

Capstone: \_\_\_\_\_

Grade Level (s): 9-12

Semester \_\_\_\_\_ Year X

Year of State Framework Adoption \_\_\_\_\_

This course meets graduation requirements:

- English
- Fine Arts
- Foreign Language
- Health & Safety
- Math
- Physical Education
- Science
- Social Science
- Elective

Department/Cluster Approval      Date

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\*Instructional materials appropriate for English Language Learners are required.

\*\*For AP/Honors course attach a page describing how this course is above and beyond a regular course. Also, explain why this course is the equivalent of a college level class.

**1. Prerequisite(s):**

- B or better in Integrated Math 3 or equivalent OR teacher recommendation.

**2. Short description of course which may also be used in the registration manual:**

Precalculus Honors is a year course which focus on mathematics they have learned from Integrated Math 1-3, Trigonometry, some Mathematical Analysis and Linear Algebra. This course will cover 11 chapters in 36 weeks and relies heavily on individual effort and individual learning process. Technology, including the use of internet, is incorporated into the course work to encourage discovery, problem solving and to apply mathematics to real life situations, and the use of a graphing calculator (TI 84 or above) is required.

The goals of the course are:

- To develop the skills within the student to move directly into a college level calculus course
- To develop a strong foundation in Precalculus concepts to aid the student in successfully completing a year of calculus in the following year at the high school.
- Students will study the theory of functions and graphs, including algebraic and polynomial functions, exponential and logarithmic functions and trigonometric functions. Students will also study applications of trigonometry, trigonometric identities and equations, and the concept of analytic geometry.

**3. Describe how this course integrates the schools SLO (former ESLRs- Expected School-wide Learning Results):**

Students will be empowered to think independently using reason, research and imagination. Students will be adaptable to changing technologies as well gracious in victory. In addition all pupils will be literate in communicating clearly and effectively. It is expected that they become ethical citizens in our global community. Students will be smart, resilient and college ready.

**4. Describe the additional efforts/teaching techniques/methodology to be used to meet the needs of English Language Learners:**

The special needs of English language learners are met throughout the course in a number of ways:

- a. By using the Sheltered Instruction Observation Protocol (SIOP) or other researched based strategies that engage students in learning and communicating their thoughts in the four language domains.
- b. By probing prior knowledge to connect existing knowledge with knowledge to be learned
- c. By teaching concepts for which English learners may not have a cultural reference, including obscure terms, and academic vocabulary
- d. By defining abstract concepts in concrete terms, and using specific examples
- e. By using graphic organizers and rubrics to set expectations and facilitate organization of thought
- f. By using a variety of other audio/visual aids during instruction, such as pictures, films, and realia
- g. By encouraging students to express themselves in a variety of modalities
- h. By satisfying student needs as outlined by each student's active IEP.

**5. Describe the interdepartmental articulation process for this course:**

The study of mathematics in each year of high school leads directly to preparedness for college and career readiness. The skills learned in math are applied to other courses of study including science, social science, and Career Technical Education (CTE). Problem solving, communicating reasoning, modeling and data analysis that are used in mathematics prepare students to apply those same skills in all courses and in real-world scenarios.

**6. Describe how this course will integrate academic and vocational concepts, possibly through connecting activities. Describe how this course will address work-based learning/school to career concepts:**

Students are expected to be active participants in the learning process. The teacher will involve them in the introduction and development of material through questioning and class discussions. This process enables the teacher to assess the students' current knowledge and expand on it. When appropriate, students are guided in discovering concepts themselves through a study of patterns and by relating the new work to their prior knowledge. The graphing calculator will be used extensively throughout the course both to help students discover concepts and to strengthen their understanding of the concepts. Students are expected to read and study material independently and apply concepts they learn to new situations. Problem solving is emphasized throughout the course.

Homework will be given everyday and is an important part of the course, providing students with the opportunity to apply skills learned in class, strengthen their understanding of the concepts and identify areas they don't understand. Homework will be reviewed in class and it is the student's responsibility during that time to ask questions about problems he/she doesn't understand, to identify specific mistakes and to take notes on any further explanations concerning these problems. Students will also be given daily quizzes to assess skills being taught on that day and also prior materials. This has been an ongoing process throughout the entire year of Precalculus Honors.

**7. Materials of Instruction (Note: Materials of instruction for English Language Learners are required and should be listed below.)**

**A. Textbook(s) and Core Reading(s):**

Precalculus with Limits - A Graphing Approach 7e by Ron Larson (Cengage Learning)

**B. Supplemental Materials and Resources:**

- Teacher made resources
- PowerPoints for instruction
- Resources Package including solutions, assessment, and teacher's guide.
- Test Item Files
- District Performance tasks

**C. Tools, Equipment, Technology, Manipulatives, Audio-Visual:**

- Graphing Calculators
- DESMOS.COM
- IPAD/LCD Projectors
- Graph Papers
- LarsonPrecalculus.com (Solutions, interactivity, videos and tutorial help)

**8. (See below and attached)**

- **Objectives of Course:**

The objective of this course is to extend the understanding of advanced mathematics to prepare students for higher level mathematics courses such as AP Calculus. The Common Core Mathematical Practice Standards will be incorporated throughout the course along with the advanced math Common Core Standards (ie 4<sup>th</sup> Courses CCSS Standards).

1. Make Sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

This attention to the Practice Standards as well as the Content Standards will ensure that students experience mathematics as coherent, useful, and logical and make use of the student's ability to make sense of problem situations.

- **Unit detail including projects and activities including duration of units (SEE ATTACHED )**
- **Indicate references to state framework(s)/standards (If state standard is not applicable then national standard should be used) (SEE ATTACHED)**

- **Student performance standards**

Guidelines for grading are:

A	90 – 100%
B	80 – 89%
C	70 – 79%
D	60 – 69%
F	59% below

The suggested weight distribution is:

- Chapter Test 45%
- Final Exam 20%
- Quizzes 20%
- Assignments 15%

- **Evaluation/assessment/rubrics**

Tests will be administered at the end of the chapters. Teacher will generate additional tests/quizzes to administer at the end of 6-week grading periods.

- **Include minimal attainment for student to pass course**

Students must attain at least 60% of the points for homework, classwork, alternative assessment, portfolio, projects, quizzes, and tests in order to pass this course.

	<b>Chapter Name</b>	<b>Topics</b>	<b>Common Core Standards</b>
<b>Semester 1</b>	Chapter 1: Functions and Their Graphs	<ul style="list-style-type: none"> <li>• Lines in the Plane</li> <li>• Functions</li> <li>• Graphs of Functions</li> <li>• Shifting, Reflecting, and Stretching Graphs</li> <li>• Combinations of Functions</li> <li>• Inverse Functions</li> <li>• Linear Models and Scatter Plots</li> </ul>	<ul style="list-style-type: none"> <li>• Introduction to Functions (F.BF.1)</li> <li>• Graphs of Functions (F.BF.1, F.IF.7)</li> <li>• Quadratic Functions (F.BF.1, F.IF.7)</li> <li>• Graphs and Transformations (F.BF.1, F.IF.7)</li> <li>• Operations on Functions (F.BF.1, F.IF.7)</li> <li>• Inverse Functions (F.BF.4)</li> <li>• One-to-One Functions (F.BF.4, F.IF.4b, F.IF.4c)</li> <li>• Rates of Changes (F.BF.1)</li> </ul>
<b>Semester 1</b>	Chapter 2: Polynomial and Rational Functions	<ul style="list-style-type: none"> <li>• Quadratic Functions</li> <li>• Polynomial Functions of Higher Degree</li> <li>• Real Zeros of Polynomial Functions</li> <li>• Complex Numbers</li> <li>• The Fundamental Theorem of Algebra</li> <li>• Rational Functions and Asymptotes</li> <li>• Graphs of Rational Functions</li> <li>• Quadratic Models</li> </ul>	<ul style="list-style-type: none"> <li>• Polynomial Functions (A.APR.6, A.APR.7)</li> <li>• The Division Algorithm (A.APR.6, A.APR.7)</li> <li>• Remainder and Factor Theorems (A.APR.6, A.APR.7)</li> <li>• The Rational Zero Test and Finding Real Zeros (A.APR.6, A.APR.7)</li> <li>• Graphs of Polynomial Functions (F.IF.7, F.IF.7d)</li> <li>• Rational Functions (F.IF.7, F.IF.7d)</li> <li>• Vertical Asymptotes and Holes (F.IF.7, F.IF.7d)</li> <li>• Graphing Rational Functions (F.IF.7, F.IF.7d)</li> <li>• Complex Numbers (N.CN.3, N.CN.8)</li> <li>• Fundamental Theorem of Algebra (N.CN.9)</li> </ul>

	Chapter 3: Exponential and Logarithmic Functions	<ul style="list-style-type: none"> <li>• Exponential and Their Graphs</li> <li>• Logarithmic Functions and Their Graphs</li> <li>• Properties of Logarithms</li> <li>• Solving Exponential and Logarithmic Equations</li> <li>• Exponential and Logarithmic Models</li> <li>• Nonlinear Models</li> </ul>	<ul style="list-style-type: none"> <li>• Solving Exponential Equations (F.BF.5)</li> <li>• Solving Logarithmic Equations (F.BF.5)</li> <li>• Modeling with Exponential and Logarithmic Functions (F.BF.5)</li> </ul>
<b>Semester 1</b>	Chapter 4: Trigonometric Functions	<ul style="list-style-type: none"> <li>• Radian and Degree Measure</li> <li>• Trigonometric Functions: The Unit Circle</li> <li>• Right Triangle Trigonometry</li> <li>• Trigonometric Functions of Any Angle</li> <li>• Graphs of Sine and Cosine Functions</li> <li>• Graphs of Other Trigonometric Functions</li> <li>• Inverse Trigonometric Functions</li> <li>• Applications and Models</li> </ul>	<ul style="list-style-type: none"> <li>• Right Triangle Trigonometry (F.TF.3)</li> <li>• Trigonometric Ratios (F.TF.3)</li> <li>• Conversion Between Decimal and DMS Form (F.TF.3)</li> <li>• Special Angles (F.TF.3)</li> <li>• Solving Right Triangles (F.TF.3)</li> <li>• Right Triangle Real World Situations (F.TF.3)</li> <li>• Indirect Measurement (F.TF.3)</li> <li>• Extending Angle Measures and Coterminal Angles (F.TF.3)</li> <li>• Radian Angle Measure and Conversion between Degrees and Radians (F.TF.3)</li> <li>• Arc Length (F.TF.3)</li> <li>• Trigonometric Functions and Trigonometric Ratios in the Coordinate Plane (F.TF.3)</li> <li>• Unit Circle and Reference Angles (F.TF.3, F.TF.4)</li> <li>• Finding Trigonometric Values (F.TF.3, F.TF.4)</li> <li>• Graphs of the Sine Functions (F.TF.4, F.TF.6)</li> <li>• Graphs of the Cosine Functions (F.TF.4, F.TF.6)</li> <li>• Graphs of the Cosecant Functions (F.TF.6)</li> <li>• Graphs of the Secant Functions (F.TF.6)</li> </ul>

<b>Semester 1</b>	Chapter 5: Analytic Trigonometry	<ul style="list-style-type: none"> <li>• Using Fundamental Identities</li> <li>• Verifying Trigonometric Identities</li> <li>• Solving Trigonometric Equations</li> <li>• Sum and Difference Formulas</li> <li>• Multiple-Angle and Product-to-Sum Formulas</li> </ul>	<ul style="list-style-type: none"> <li>• Quotient Identities (F.TF.9)</li> <li>• Reciprocal Identities (F.TF.9)</li> <li>• Pythagorean Identities (F.TF.9)</li> <li>• Periodicity Identities (F.TF.9)</li> <li>• Negative Angle Identities (F.TF.9)</li> <li>• Basic Trigonometric Equations (F.TF.6, F.TF.7)</li> <li>• Solving Trigonometric Equations Graphically (F.TF.6, F.TF.7)</li> <li>• Inverse Trigonometric Functions (F.TF.7)</li> <li>• Identities and Proof (F.TF.9)</li> <li>• Basic Trigonometric Identities (F.TF.9)</li> <li>• Strategies for Proving Trigonometric Identities (F.TF.9)</li> <li>• Identities and Proof (F.TF.9)</li> <li>• Basic Trigonometric Identities (F.TF.9)</li> <li>• Strategies for Proving Trigonometric Identities (F.TF.9)</li> </ul>
<b>Semester 2</b>	Chapter 6: Additional Topics in Trigonometry	<ul style="list-style-type: none"> <li>• Law of Sines</li> <li>• Law of Cosines</li> <li>• Vectors in the Plane</li> <li>• Vectors and Dot Products</li> <li>• Trigonometric Form of a Complex Number</li> </ul>	<ul style="list-style-type: none"> <li>• The Law of Cosines (G.SRT.10, G.SRT.11)</li> <li>• Solving of Triangle Using the Law of Cosines (G.SRT.11)</li> <li>• Applications using the Law of Cosines (G.SRT.11)</li> <li>• The Law of Sines (G.SRT.10, G.SRT.11)</li> <li>• Supplementary Angle Identity (G.SRT.11)</li> <li>• Area of a Triangle Using the Law of Sines (G.SRT.9)</li> <li>• Heron's Formula (G.SRT.9)</li> </ul>

<b>Semester 2</b>	Chapter 7: Linear Systems and Matrices	<ul style="list-style-type: none"> <li>• Solving Systems of Equations</li> <li>• Systems of Linear Equations in Two Variables</li> <li>• Multivariable Linear Systems</li> <li>• Matrices and Systems of Equations</li> <li>• Operations with Matrices</li> <li>• The Inverse of a Square Matrix</li> <li>• The Determinant of a Square Matrix</li> <li>• Applications of Matrices and Determinants</li> </ul>	<ul style="list-style-type: none"> <li>• Solving Systems of Equations (N.VM.6, A.REI.11)</li> <li>• Matrices (N.VM.7, N.VM.8, N.VM.9, N.VM.10)</li> <li>• Matrix Operations (N.VM.6, N.VM.7, N.VM.8, N.VM.9, N.VM.10)</li> <li>• Matrix Operations (continued) (N.VM.6, N.VM.7, N.VM.8, N.VM.9, N.VM.10.)</li> <li>• Matrix Methods for Square Systems (N.VM.9)</li> <li>• Solve a System of Equations Using Matrices (N.VM.6, N.VM.8, N.VM.9, and A.REI.9)</li> <li>• Type of System and Number of Solutions * (N.VM.6, N.VM.7, N.VM.8, N.VM.9, N.VM.10)</li> <li>• Consistent and Inconsistent Systems* (N.VM.6, N.VM.7, N.VM.8, N.VM.9, N.VM.10)</li> <li>• Solving Nonlinear Systems Algebraically* (A.REI.7, A.REI.8, A.REI.9)</li> <li>• Solving Nonlinear Systems Graphically* (A.REI.7)</li> </ul>
<b>Semester 2</b>	Chapter 8: Sequences, Series, and Probability	<ul style="list-style-type: none"> <li>• Sequences and Series</li> <li>• Arithmetic Sequences and Partial Sums</li> <li>• Geometric Sequences and Series</li> <li>• The Binomial Theorem</li> <li>• Counting Principles</li> <li>• Probability</li> </ul>	<ul style="list-style-type: none"> <li>• Binomial Theorem (A.APR.5)</li> </ul>

<b>Semester 2</b>	Chapter 9: Topics in Analytic Geometry	<ul style="list-style-type: none"> <li>• Circles and Parabolas</li> <li>• Ellipses</li> <li>• Hyperbolas and Rotation of Conics</li> <li>• Parametric Equations</li> <li>• Polar Coordinates</li> <li>• Graphs of Polar Equations</li> <li>• Polar Equations and Conics</li> </ul>	<ul style="list-style-type: none"> <li>• Standard Equation of an Ellipse Centered at the Origin (G.CPE.3, G.CPE.3a)</li> <li>• Characteristics of Ellipses (G.CPE.3, G.CPE.3a)</li> <li>• Standard Equation of a Hyperbola Centered at the Origin (G.CPE.3, G.CPE.3a)</li> <li>• Characteristics of Hyperbolas (G.CPE.3, G.CPE.3a)</li> <li>• The Polar Coordinate System (N.CN.4)</li> <li>• Coordinate Conversion Formulas (N.CN.4)</li> <li>• Polar Graphs (N.CN.4)</li> <li>• Polar Equations of Conics * (N.CN.4)</li> </ul>
<b>Semester 2</b>	Chapter 10: Analytic Geometry in Three Dimensions	<ul style="list-style-type: none"> <li>• The Three-Dimensional Coordinate System</li> <li>• Vectors in Space</li> <li>• The Cross Product of Two Vectors</li> <li>• Lines and Planes in Space</li> </ul>	<ul style="list-style-type: none"> <li>• Vectors in the Plane (N.VM.1, N.VM.2, N.VM.5a, N.VM.5b)</li> <li>• Properties of Vectors (N.VM.4a, N.VM.4b, N.VM.4c)</li> <li>• Applications of Vectors in the Plane (N.VM.3)</li> <li>• The Dot Product *(N.VM.3)</li> <li>• Properties of the Dot Product*(N.VM.3)</li> </ul>
<b>Semester2</b>	Chapter 11: Limits and an Introduction to Calculus	<ul style="list-style-type: none"> <li>• Introduction to Limits</li> <li>• Techniques for Evaluating Limits</li> <li>• The Tangent Line Problem</li> <li>• Limits at Infinity and Limits of Sequences</li> <li>• The Area Problem</li> </ul>	<ul style="list-style-type: none"> <li>• Introduction to Calculus</li> </ul>

(NOTE: Depending on need, order of topics may be adjusted at any time during the semester based on teacher's decision.)