College of San Mateo
Official Course Outline

1. **COURSE ID:** MATH 222 **TITLE:** Precalculus **C-ID:** MATH 155
   Units: 5.0 units **Hours/Semester:** 80.0-90.0 Lecture hours; and 160.0-180.0 Homework hours
   Method of Grading: Letter Grade Only
   Prerequisite: MATH 130 or placement by other college approved methods.

2. **COURSE DESIGNATION:**
   Degree Credit
   Transfer credit: CSU; UC
   AA/AS Degree Requirements:
   CSM - COMPETENCY REQUIREMENTS: C1 Math/Quantitative Reasoning Basic Competency
   CSM - GENERAL EDUCATION REQUIREMENTS: E2b. Communication and Analytical Thinking
   CSU GE:
   CSU GE Area B: SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING: B4 - Mathematics/Quantitative Reasoning
   IGETC:
   IGETC Area 2: MATHEMATICAL CONCEPTS AND QUANTITATIVE REASONING: A: Math

3. **COURSE DESCRIPTIONS:**
   Catalog Description:
   Study of more advanced algebra including the theory of equations, complex numbers, logarithmic and exponential functions, sequences and series, review of trigonometry and topics of analytic geometry, polar coordinates.

4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**
   Upon successful completion of this course, a student will meet the following outcomes:
   1. Graph functions and relations in rectangular coordinates and polar coordinates;
   2. Synthesize results from the graphs and/or equations of functions and relations;
   3. Apply transformations to the graphs of functions and relations;
   4. Recognize the relationship between functions and their inverses graphically and algebraically;
   5. Solve and apply equations including rational, linear, polynomial, exponential, absolute value, radical, and logarithmic, and solve linear, nonlinear, and absolute value inequalities;
   6. Solve systems of equations and inequalities;
   7. Apply functions to model real world applications;
   8. Identify special triangles and their related angle and side measures;
   9. Evaluate the trigonometric function of an angle given in degree and radian measure;
   10. Manipulate and simplify a trigonometric expression;
   11. Solve trigonometric equations, triangles, and applications;
   12. Graph the basic trigonometric functions and apply changes in period, phase and amplitude to generate new graphs; and
   13. Prove trigonometric identities

5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**
   Upon successful completion of this course, a student will be able to:
   1. Graph functions and relations in rectangular coordinates and polar coordinates;
   2. Synthesize results from the graphs and/or equations of functions and relations;
   3. Apply transformations to the graphs of functions and relations;
   4. Recognize the relationship between functions and their inverses graphically and algebraically;
   5. Solve and apply equations including rational, linear, polynomial, exponential, absolute value, radical, and logarithmic, and solve linear, nonlinear, and absolute value inequalities;
   6. Solve systems of equations and inequalities;
   7. Apply functions to model real world applications;
   8. Identify special triangles and their related angle and side measures;
   9. Evaluate the trigonometric function of an angle given in degree and radian measure;
   10. Manipulate and simplify a trigonometric expression;
   11. Solve trigonometric equations, triangles, and applications;
   12. Graph the basic trigonometric functions and apply changes in period, phase and amplitude to generate new

graphs; and
13. Prove trigonometric identities

6. **COURSE CONTENT:**

Lecture Content:

1. Functions including linear, polynomial, rational, radical, exponential, absolute value, logarithmic, trigonometric; definitions, evaluation, domain and range;
2. Inverses of functions;
3. Algebra of functions;
4. Graphs of functions including asymptotic behavior, intercepts, and vertices;
5. Transformations of quadratic, absolute value, radical, rational, logarithmic, exponential functions;
6. Equations including rational, linear, radical, polynomial, exponential, trigonometric, logarithmic, and absolute value;
7. Linear, nonlinear, and absolute value inequalities;
8. Systems of equations and inequalities;
9. Characterization of real and complex zeros of polynomials;
10. Unit circle and right triangle trigonometry;
11. Trigonometric and inverse trigonometric identities and formulas;
12. Graphing trigonometric functions: period, amplitude, phase shift, inverse trigonometric functions; and
13. Polar coordinates
14. Apply functions to model real world applications.

7. **REPRESENTATIVE METHODS OF INSTRUCTION:**

Typical methods of instruction may include:

A. Lecture
B. Other (Specify): Examples of instructor-initiated strategies that will assist students in meeting the course objectives include: A. Out-of-class assignments: students will need to complete assigned problems and projects. B. Reading assignments: Instructor may assign text readings for discussion of a topic in class. C. Writing assignments: 1. Students will submit written and/or online homework assignments. 2. Students may be assigned papers including mathematical modeling. 1:>. Critical thinking: 1. Lecture/discussion to understand problem-solving process. 2. Students may practice critical thinking in small group problem solving. 3. Students will evaluate proposed solutions in light of constraints of the problem. E. Resources available on CD and the internet may be used to augment the text.

8. **REPRESENTATIVE ASSIGNMENTS**

Representative assignments in this course may include, but are not limited to the following:

Writing Assignments:

Students will submit written and/or online homework assignments. Students may be assigned papers including mathematical modeling.

Reading Assignments:

Instructor may assign text readings for discussion of a topic in class.

Other Outside Assignments:

Students will need to complete assigned problems and projects.

9. **REPRESENTATIVE METHODS OF EVALUATION**

Representative methods of evaluation may include:

A. Class Participation
B. Exams/Tests
C. Group Projects
D. Homework
E. Quizzes
F. Written examination
G. A. Written individual assignments and/or journal- to demonstrate individual student progress toward objectives. B. Small group presentations - to demonstrate student participation in problemsolving process C. Written exams/quizzes - to reflect student knowledge of vocabulary. concepts, and application of concepts to problem-solving as presented in lectures and discussion, small group sessions, and text readings. D. Final Examination - to reflect student cumulative knowledge of vocabulary, concepts, and applications of concepts to problem-solving as presented in lectures and discussions, small group sessions, and text readings. E. Participation - to reflect student involvement in class discussions, small group

sessions and presentations, etc.

10. **REPRESENTATIVE TEXT(S):**
    Possible textbooks include:
    A. Cohen, D., T. Lee and D. Sklar. *PreCalculus*, ed. Brookes/Cole/Cengage, 2016
    B. Beecher, J., J. Penna, D. Ellenbogen and M. Bittinger. *PreCalculus: Graphs and Models*, ed. Pearson Education, 2016

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Course Originator: Christopher Walker