1. **COURSE ID:** MATH 222   **TITLE:** Precalculus   **C-ID:** MATH 155
   Units: 5.0 units **Hours/Semester:** 80.0-90.0 Lecture hours; 160.0-180.0 Homework hours; 240.0-270.0 Total
   Student Learning 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, transformation of functions and other techniques of graphing, including trigonometric
   > functions, review of trigonometry with trigonometric identities and trigonometric equations, sequences and
   > series, 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; analyze symbolic and graphical representations of functions --polynomial, absolute value, radical, rational, exponential, logarithmic, and trigonometric function families including their domains, ranges and transformations
   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 and find inverse of all functions, including trigonometric functions, by using graphical and algebraic approaches;
   5. Solve rational, linear, polynomial, exponential, absolute value, radical, logarithmic, and trigonometric equations, 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 by using trigonometric identities;
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 and inverse trigonometric functions: period, amplitude, and phase shift;
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. Activity
C. Discussion
D. Individualized Instruction
E. Observation and Demonstration

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 projects 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. Class Work
C. Exams/Tests
D. Group Projects
E. Homework
F. Quizzes
G. Written examination
H. 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. Beecher, J., J. Penna, D. Ellenbogen and M. Bittinger. *PreCalculus: Graphs and Models*, ed. Pearson Education, 2016
   B. Cohen, D., T. Lee and D. Sklar. *PreCalculus*, ed. Brookes/Cole/Cengage, 2016

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Course Originator: Yelena Feinman