TAFTCOLLEGE

Reviewed by: M. Martinez
Reviewed by: D. Jones
Reviewed by: M. Mayfield
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Mathematics (MATH) 1540 Precalculus Mathematics (4 Unit) CSU: UC
[formerly Mathematics 15]

Prerequisite: Qualification by assessment process or completion of Mathematics 1060 and Mathematics 1530, or the equivalent

Prerequisite knowledge/skills: Before entering the course the student should be able to:

1. identify numbers as belonging to specified sets, and graph discrete and continuous sets of real numbers,
2. perform the basic arithmetic operations with positive and negative real numbers,
3. know and apply the rules of exponents and the order of operations in algebraic calculations,
4. know and apply the properties of addition and multiplication for real numbers and identify their use in practice,
5. solve linear equations and inequalities in one variable,
6. solve and graph the solutions of compound inequalities or absolute value inequalities in one variable, and
7. perform addition, subtraction, multiplication and division of polynomials,
8. factor simple polynomials, with special emphasis on quadratic trinomials and solve related polynomial equations,
9. add, subtract, multiply and divide rational algebraic expressions, and reduce to lowest terms,
10. solve equations involving rational algebraic expressions,
11. simplify radical expressions involving numbers and/or variables,
12. use fractional exponents,
13. perform addition, subtraction, multiplication and division of expression involving radicals and complex numbers and simplify the results,
14. solve equations that involve radicals,
15. solve quadratic equations in one variable by factoring, completing the square and the quadratic formula,
16. solve and graph quadratic inequalities in one variable,
17. graph points in the rectangular coordinate system, and straight lines from ordered pairs obtained from a linear equation,
18. determine the slope of the line between any specified pair of points,
19. know the slope formulas for the equation of a straight line, and be able to determine the equation of a particular straight line from specified input information,
20. solve and graph linear inequalities in two variables,
21. solve linear systems of equations in two or three variables algebraically, and solve those in two dimensions graphically,
22. analyze and solve application problems requiring the use of linear systems of equations in two or three variables,
23. evaluate determinants and use them to solve linear systems of equations,
24. determine whether or not a specified relation is a function, and
25. given a function, compute the value of the function given the value of the independent variable, and be able to construct the inverse of simple functions.

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Advisory: Eligibility for English 1000 and Reading 1005 strongly recommended

Total Hours: 64 hours lecture. 128 Outside of class hours. (192 Total Student learning hours)

Catalog Description: Preparation for calculus: polynomial, absolute value, radical, rational, exponential, logarithmic, and trigonometric functions and their graphs; analytic geometry, polar coordinates.

Type of Class/Course: Degree Credit

Text:

Lial, Margaret L., et al. *Precalculus*. 6th ed. Pearson, 2016.

Additional Instructional Materials:
Students Solutions Manual for this course. 4th ed. Graphing calculator

Upon successful completion of the course, students 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

Course Scope and Content:

Unit I Graphs and Functions; Inverse Functions
- A. Identify graphs of polynomial functions.
- B. Identify horizontal and vertical translations.
- C. Identify the effect of the magnitude and sign of leading coefficients on the graph of a polynomial.
- D. Construct and graph piecewise and composite functions.
- E. Identify local minimums and maximums.
- F. Identify when an inverse function will exist then find that inverse.
- G. Calculate a least squares regression line.
- H. Interpret the meaning of Spearman's Correlation Coefficient.

Unit II Rational and Polynomial Functions
- A. Identify graphs of polynomial functions of higher degree.
- B. Find real zeros of polynomial functions.

C. Identify and perform appropriate algebraic tasks with complex numbers.
D. Identify asymptotic behavior of rational functions.
E. Develop and use quadratic models.

Unit III Exponential and Logarithmic Functions
A. Identify graphs of exponential functions.
B. Identify graphs of logarithmic functions.
C. Properly employ the properties of logarithms in problem solving.
D. Develop, through the use of technology, exponential and logarithmic models.

Unit IV Trigonometric and Inverse Trigonometric Functions
A. Convert from radian to degrees.
B. Convert from degrees to radians.
C. Solve problems using unit circle and right triangle trigonometry
D. Solve problems involving trigonometric and inverse trigonometric functions.
E. Graph trigonometric and inverse trigonometric functions.
F. Apply trigonometric models.

Unit V Trigonometric Identities and Equations
A. Use fundamental trigonometric identities.
B. Solve trigonometric equations.

Unit VI Systems of Linear Equations
A. Solve systems of two equations with two unknown quantities algebraically.
B. Solve systems of three equations with three unknown quantities algebraically.
C. Solve multivariable systems of equations using matrices.
D. Calculate the inverse of a square matrix.
E. Solve application problems using matrices.

Unit VII Sequences, Series, Mathematical Induction, and the Binomial Theorem
A. Identify basic properties of a sequence and series.
B. Calculate partial sums.
C. Utilize the basic properties of mathematical induction to prove elementary mathematical formulas.
D. Apply Pascal's Triangle to a binomial expansion.

Learning Activities Required Outside of Class:

The students in this class will spend a minimum of 8 hours per week outside of the regular class time doing the following:

1. Studying,
2. Answering questions,
3. Skill practice,
4. Completing required reading, and
5. Problem solving activity or exercise.

Methods of Instruction:

1. Lecture-demonstrations and sample problems solved by the instructor.

Methods of Evaluation:

1. Computational or non-computational problem-solving demonstrations, including:
   a. exams,
   b. homework problems, and
   c. quizzes.

Supplemental Data:

TOP Code:	170100: Mathematics, General
SAM Priority Code:	E: Non-Occupational
Distance Education:	Not Applicable
Funding Agency:	Y: Not Applicable(funds not used)
Program Status:	1: Program Applicable
Noncredit Category:	Y: Not Applicable, Credit Course
Special Class Status:	N: Course is not a special class
Basic Skills Status:	N: Course is not a basic skills course
Prior to College Level:	Y: Not applicable
Cooperative Work Experience:	N: Is not part of a cooperative work experience education program
Eligible for Credit by Exam:	E: Credit By Exam
Eligible for Pass/No Pass:	C: Pass/No Pass
Taft College General Education:	CSB4: CSU Area B4 IG2A: IGETC Area 2A LCAT: Local GE Communication