

Mathematics 1561 – Precalculus

Student Learning Outcomes

- 1. The students will demonstrate an understanding of factual knowledge including the mathematical notation and terminology used in this course.** Students will read, interpret, and use the vocabulary, symbolism, and basic definitions used in precalculus pertaining to the real and complex numbers; exponents and radicals; polynomials, factoring, and rational expressions; equations and inequalities; functions; polynomial and rational functions; inverse functions; exponential and logarithmic functions; graphs and their transformations; six trigonometric functions; types of angle measure and notation; parts of triangles and circles; types of triangles; parabolas, ellipses, and hyperbolas; and asymptotes.
- 2. The students will describe the fundamental principles including the mathematical rules and theorems arising from the concepts covered in this course.** Students will identify and apply the laws and formulas that result directly from the definitions; for example, rules of exponents, exponential and logarithmic properties, the quadratic formula, slope and formulas for the equations of lines, theorems relating to the zeros of polynomial functions, the fundamental trigonometric identities, properties of angles and triangles, characteristics of the trigonometric functions and inverse trigonometric functions, formulas of the conic sections, translation of axes, formulas relating polar and rectangular coordinates, and De Moivre's Theorem.
- 3. The students will apply course material using techniques and procedures covered in this course to solve problems.** Students will utilize the facts, formulas, and the techniques learned in this course to simplify algebraic expressions; graph functions; solve equations and systems of equations; prove trigonometric identities; solve trigonometric equations; solve various types of triangle problems; and recognize and graph trigonometric and inverse trigonometric functions, conic sections, algebraic curves, polar equations, and parametric equations.
- 4. The students will develop specific skills, competencies, and thought processes sufficient to support further study or work in this field or related fields.** Students will acquire a level of proficiency in the fundamental concepts and applications in precalculus necessary for success in calculus.

Course Content

Textbook: *Precalculus: Functions and Graphs*, Eleventh Edition, by Swokowski and Cole. Content consists of the following topics, listed according to the corresponding chapters in the text. (See textbook “Contents.”)

- 1. Topics from Algebra:** Real Numbers, Exponents and Radicals, Algebraic Expressions, Equations, Complex Numbers, Inequalities.
- 2. Graphs and Functions:** Rectangular Coordinate System, Graphs of Equations, Lines, Definition of Function, Graphs of Functions, Quadratic Functions, Operations on Functions.
- 3. Polynomials and Rational Functions:** Polynomial Functions of Degree Greater Than 2, Properties of Division, Zeros of Polynomials, Complex and Rational Zeros of Polynomials, Rational Functions.

4. **Inverse, Exponential, and Logarithmic Functions:** Inverse Functions, Exponential Functions, The Natural Exponential Function, Logarithmic Functions, Properties of Logarithms, Exponential and Logarithmic Equations.
5. **The Trigonometric Functions:** Angles, Trigonometric Functions of Angles, Trigonometric Functions of Real Numbers, Values of the Trigonometric Functions, Trigonometric Graphs, Additional Trigonometric Graphs, Applied Problems.
6. **Analytic Trigonometry:** Verifying Trigonometric Identities, Trigonometric Equations, The Addition and Subtraction Formulas, Multiple-Angle Formulas, The Inverse Trigonometric Functions.
7. **Applications of Trigonometry:** The Law of Sines, The Law of Cosines, Trigonometric Form for Complex Numbers, De Moivre's Theorem and n th Roots of Complex Numbers.
8. **Systems of Equations and Inequalities:** Systems of Equations, Systems of Linear Equations in Two (or Three) Variables.
10. **Topics from Analytic Geometry:** Parabolas, Ellipses, Hyperbolas, Plane Curves and Parametric Equations, Polar Coordinates.