**Mathematics 3310 – Introduction to Problem Solving**

**Student Learning Outcomes**

**1. The students will demonstrate factual knowledge including the mathematical notation and terminology used in this course.** Learn the vocabulary, symbolism, and basic definitions used in this course including definitions and terminology used in algebra; trigonometry; analytic geometry; transformational geometry; finance; linear programming; and progressions.

**2. The students will describe the fundamental principles including laws and theorems arising from concepts covered in this course.** Become familiar with the laws and formulas that result directly from the definitions used in algebra; trigonometry; analytic geometry; transformational geometry; finance; linear programming; and progressions.

**3. The students will apply course material along with techniques and procedures covered in this course to solve problems.** Use the facts, formulas, and techniques learned in this course to solve application problems in a variety of fields to include physics; chemistry; business; life sciences; and social sciences.

**4. The students will develop specific skills, competencies, and thought processes sufficient to support further study or work in this field or related fields.** Acquire a level of proficiency in the fundamental concepts and applications necessary for further study in academic fields requiring a solid background in mathematics as a prerequisite, or for work in occupational fields requiring a solid background in mathematics. These fields might include teaching mathematics in the secondary schools; engineering; physics; business; life sciences; and social sciences.

**Course Content**

 **Textbook:** *Precalculus,* Eighth Edition, by Demana, Waits, Foley, and Kennedy, ISBN-13: 9780321656933. The following chapters including the particular sections listed are covered.

**P. Prerequisites.** Real Numbers; Solving Equations Graphically, Numerically, and Algebraically; Complex Numbers.

**1. Functions and Graphs.** Modeling with Functions.

**2. Polynomial Functions, Power and Rational Functions.** Linear and Quadratic Functions and Modeling; Power Functions with Modeling; Real Zeros of Polynomial Functions; Complex Zeros and the Fundamental Theorem of Algebra; Transformations of the Reciprocal Function.

**3. Exponential, Logistic, and Logarithmic Functions.** Mathematics of Finance.

**4. Trigonometric Functions.** Graphs of Sine and Cosine: Sinusoids; Solving Problems with Trigonometry.

**5. Analytic Trigonometry.** Fundamental Identities; Proving Trigonometric Identities; Double Angle Identities;The Law of Sines; The Law of Cosines.

**6. Applications of Trigonometry:** Vectors in the Plane; Dot Product of Vectors; De Moivre’s Theorem and $n$th Roots.

**7. Systems of Equations and Matrices.** Solving Systems of Two Equations; Systems of Inequalities in Two Variables; Linear Programming.

**8. Analytic Geometry in Two and Three Dimensions.** Definition of a Parabola; Reflective Property of a Parabola; Definition of an Ellipse; Reflective Property of an Ellipse; Definition of a Hyperbola; Reflective Property of a Hyperbola; Eccentricity.

**9. Discrete Mathematics.** The Binomial Theorem; Probability; Sequences; Series, Statistics and Data (Graphical); Statistics and Data (Algebraic).