

## Mathematics 1321 – Analytic Geometry

### Student Learning Outcomes

- 1. The students will demonstrate factual knowledge including the mathematical notation and terminology used in this course.** Students will read, interpret, and use the vocabulary, symbolism, the graphing and algebraic techniques, and basic definitions and used in analytic geometry including distance, lines, circles, parabolas, ellipses, hyperbolas, asymptotes, vectors, and parameters.
- 2. The students will describe the fundamental principles including the laws 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 directed distance, conics, translation, and rotations of axes, algebraic functions, polar coordinates, parametric equations, and vectors. By means of coordinate systems, use algebraic methods to study geometry and to make graphical representations of algebraic equations.
- 3. Students will apply course material along with techniques and procedures covered in this course to solve problems.** Students will use the facts, formulas, and techniques learned in this course to prove geometric theorems analytically; and recognize and graph conics, algebraic curves, polar equations, and parametric equations.
- 4. The Student 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 necessary for further study in academic areas requiring analytic geometry as a prerequisite, or for work in occupational fields requiring a background in analytic geometry. These fields might include education, business, finance, marketing, computer science, physical sciences, and engineering, as well as mathematics.

### Course Content

**Textbook:** *Analytic Geometry*, Seventh Edition, by Fuller/Tarwater. The following chapters including the particular sections listed are covered. (See textbook “Contents”)

- 1. Fundamental Concepts.** Basic concepts (absolute value, graphing, distance formula), inclination and slope of a line, division of a line segment, analytic proofs of geometric theorems, relations and functions.
- 2. The Straight Line and the Circle.** Lines and first-degree equations, other forms of first-degree equations, intersection of lines, directed distance from a line to a point, families of lines, circles, families of circles.
- 3. Conics.** The parabola, parabola with vertex at  $(h, k)$ , the ellipse, the hyperbola (and symmetry).
- 4. Simplification of Equations.** Simplification by translation, rotation of axes, simplification by rotations and translations, identification of a conic.

5. **Algebraic Curves.** Polynomials, rational functions, slant asymptotes, irrational equations.
7. **Polar Coordinates.** The polar coordinate system, relations between rectangular and polar coordinates, graphs of polar coordinate equations, aids in graphing polar coordinate equations.
8. **Parametric Equations.** Parametric equations.
9. **Space Coordinates and Surfaces.** Space coordinates.
10. **Vectors, Planes, and Lines.** Operations on vectors, vectors in space, the scalar product of two vectors, the equation of a plane, vector equation of a line.

### **Additional Content**

Any section or chapter not listed previously.