

**NVCC COLLEGE-WIDE COURSE CONTENT SUMMARY**  
**MTH 178 – TOPICS IN ANALYTIC GEOMETRY (2 CR.)**

**Course Description**

Covers conic sections, polar and parametric graphing. Designed for mathematical, physical, and engineering science programs. Lecture 2 hours per week.

**General Course Purpose**

This course is designed to satisfy the Virginia Department of Education's 6-12 Mathematics teaching endorsement requirement of a course in Analytic Geometry for those that have the required Calculus credits but not the necessary credits in Analytic Geometry.

**Course Prerequisites/Co-requisites**

The prerequisite is satisfactory completion of MTH 173 or equivalent. Co-requisite is MTH 174.

**Course Objectives**

Upon completing the course, the student will be able to:

- solve problems involving lines
- solve problems involving conic sections
- solve problems involving the polar coordinate system
- solve problems involving parametrically defined curves.

**Major Topics to be Included**

1. Given two points in the plane, determine
  - a. the distance between them
  - b. the midpoint of the line segment joining them
2. Lines
  - a. slope
  - b. intercepts
  - c. graphs of linear functions
  - d. parallel and perpendicular lines
  - e. derivation of the form of the equation of a line
3. Conic sections of form  $Ax^2 + By^2 + Cx + Dy + E = 0$ 
  - a. parabolas
    - (1) finding the vertex
    - (2) graphing
  - b. circles
    - (1) finding the center and the radius by completing the square
    - (2) graphing
  - c. ellipses
    - (1) find axes and center
    - (2) graphing
  - d. hyperbolas
    - (1) axes and asymptotes
    - (2) graphing

4. Conic Sections of the form  $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$ 
  - a. Rotation and translation Equations
  - b. Forms and graphs of second degree equations in  $x$  and  $y$ .
  
5. Polar Coordinates
  - a. Polar coordinate systems
  - b. Transformation from polar to Cartesian coordinates and vice versa
  - c. Polar functions
  - d. Graphing
  - e. Intersection of curves in polar coordinates
  - f. Equations of conic sections in polar form
  
6. Parametric Equations
  - a. Transformations between parametric and Cartesian coordinates
  - b. Graphing Parametric equations