Course Title: Calculus and Analytic Geometry II
Course No.: MAT 222  No. of Credits: 5  Associate Degree Designation: MS
Contact hrs/wk: Lecture 5 Lecture/Discussion  Lab

Course Prerequisites: A grade of C or better in MAT 221, or placement based on the department Calculus Proficiency Test, or AP Exam.

Catalog description: Continuation of 221. Techniques of integration, polar coordinates, conic sections, infinite series and vectors of two and three dimensions. Note: The order of topics covered in MAT 221 and MAT 222 may depend on the text used and the instructor.

Course Content (list of topics normally covered):

Note: Some topics may be omitted if covered in previous courses.

- Techniques of Integration
  - Integration by Parts
  - Trigonometric Integrals
  - Trigonometric Substitution
  - Partial Fractions
  - Improper Integrals
- Polar Coordinates
  - Graphing
  - Finding Lengths
  - Finding Areas
- Conic Sections
  - Parabola
  - Ellipse
  - Hyperbola
  - Conic Sections in Polar Coordinates
- Vectors of Two and Three Dimensions
  - Vector Algebra
  - Representations of Lines and Planes
  - Tangent and Normal Vectors
  - Curvature
- Infinite Series
  - Arithmetic Series
Geometric Series
p Series
Ratio Test
Root Test
Comparison Test
Integral Test
Alternating Series
Power Series
Taylor and Maclaurin Series
Binomial Series

- Parametric Curves
  Graphing
  Derivatives
  Finding Lengths
  Finding Areas

- Other Applications
  Arc Length
  Surface Area of a Solid of Revolution
  Centroids

- Differential Equations (optional)
  Direction Fields
  Separable Equations
  Linear Equations

Content-based department proficiencies:

- Be able to find anti-derivatives of various functions, choosing appropriate methods, including integration by parts, trigonometric substitution, and partial fractions.
- Be able to evaluate improper integrals using appropriate methods.
- Be able to solve first order differential equations using the techniques of separation of variables or integrating factors.
- Be able to switch freely between a conic section's description, equation, and graph.
- Be able to find areas and tangent lines of curves described by polar or parametric equations.
- Be able to determine convergence or diverge of various series, choosing appropriate methods including ratio test, root test, alternating series test, and integral test.
- Be able to generate Taylor series of various functions and find the interval and radius of convergence of the result.

Colleges-wide proficiencies assigned to course:
Students should be able to demonstrate the following:

A. Analytical skills Performance Indicators: Students should be able to:
   1. Interpret and synthesize information and ideas.
   4. Select and apply scientific and other appropriate methodologies.

B. Quantitative skills Performance Indicators: Students should be able to:
   1. Solve quantitative and mathematical problems.
2. Interpret graphs, tables, and diagrams.

Representative textbooks used for the courses:

- *Calculus: One and Several Variables, 6th ed.*, Ellis/Gulick
- *Single Variable Calculus*, 5th ed., Stewart
- *Calculus with Analytic Geometry*, 4th ed., Edwards/Penney

Approved April 22, 2006