Administrative Unit: Computer and Mathematical Sciences Department

Course Prefix and Number: MATH 222

Course Title: Calculus with Analytic Geometry II

Number of Credit Hours: 5
Lecture Hours: 5
Laboratory Hours: 0

Catalog Description: The second part of the three-part Calculus series. Transcendental functions, techniques of integration, improper integrals, infinite series and power series, parametrized curves and polar coordinates. Prerequisite: MATH 201 with grade of C or higher. Offered Spring. G.E.

Prerequisite(s)/Corequisite(s): MATH 201 with grade of C or higher.

Text(s): Most current editions of the following:


Course Objectives:

• To use calculus to formulate and solve problems and communicate solutions to others.
• To use technology as an integral part of the process of formulation, solution and communication.
• To understand calculus topics from numerical, graphical, symbolic, and analytical perspectives.
• To understand and appreciate the connections between mathematics and other disciplines.

Measurable Learning Outcomes:

• Identify the natural exponential and logarithmic functions as inverses of each other and find their derivatives and integrals.
• Solve exponential growth and decay problems arising from biology, physics, chemistry, and other sciences.
• Compute derivatives and integrals of functions containing inverse trigonometric functions.
• Analyze various indeterminate forms and apply L’Hospital’s rule to evaluate limits of such forms.
• Use the Substitution Rule and the Integration by Parts formula to evaluate indefinite and definite integrals.
• Understand special methods required to integrate trigonometric and rational functions.
• Apply numerical methods of integration such as Simpson’s Rule and the Trapezoidal Rule to approximate definite integrals.
• Classify improper integrals and distinguish between convergent and divergent improper integrals.
• Explore geometric applications of integration, such as
the length, the area of a surface, as well as their applications to physics, engineering, economics, and biology.

- Apply basic calculus ideas to parametric and polar curves to determine the arc length, surface area of revolution, and other geometric characteristics.
- Apply various tests for convergence to distinguish between absolutely and conditionally convergent and divergent numeric series.
- Find the radius and the interval of convergence of power series.
- Find Taylor and Maclaurin series for certain classes of functions.
- Explore applications of Taylor series and polynomials to approximate functions and definite integrals, to evaluate limits, and solve initial value problems.

Topical Outline (major areas of coverage):

- Logarithmic and exponential functions
- Techniques of integration
- Improper integrals
- Infinite series and power series
- Parametrized curves and polar coordinates

Material from this course may be tested on the Major Field Test (MFT) administered during the Culminating Experience course for the degree.

Recommended maximum class size for this course: 30

Library Resources:

Online databases are available at [http://www.ccis.edu/offices/library/resources.asp](http://www.ccis.edu/offices/library/resources.asp). You may access them from off-campus using your eServices login and password when prompted.

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Date: April 3, 2006

NOTE: The intention of the master syllabus is to provide an outline of the contents of this course, as specified by the faculty of Columbia College, regardless of who teaches the course, when it is taught or where it is taught. Faculty members teaching this course for Columbia College are expected to facilitate learning pursuant to the course objectives and cover the subjects listed in the topical outline. However, instructors are also encouraged to cover additional topics of interest so long as those topics are relevant to the course’s subject. The master syllabus is, therefore, prescriptive in nature but also allows for a diversity of individual approaches to course material.

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