Proposed IAI Code MTH 901 M1 900-1

MATH 207

City Colleges of Chicago Course Title: Calculus and Analytic Geometry I (IAI Code: MTH 901 M1 900-1)

Length of course: 16 Weeks

Contact Hours: 5 Contact Hours

Credit Hours: 5 Credit Hours

Lecture Hours: 5 Lecture Hours

Lab Hours:

Weekly Plan: 5 Hours

Catalogue Description:

This is the first course in calculus and analytic geometry. It explores various characteristics and equations of conics and covers techniques of differentiation for algebraic and trigonometric functions. It also includes an introduction to the Fundamental Theorem of Calculus. Technology and writing as appropriate to the discipline will be emphasized throughout the course.

Students the Course is Expected to Serve:

This course is intended for students requiring the first course in calculus.

Pre-requisites:

Placement Test -- or Prerequisite -- MATH 141 With a minimum grade of 'C' or Prerequisite -- MATH 143 With a minimum grade of 'C' or Consent of Chair --

Course Objectives:

- 1. Discuss the equations and characteristics of various conics.
- 2. Understand the concepts of a limit, continuity, and differentiability.
- 3. Apply the sum, product, quotient, and chain rules of differentiation.
- 4. Differentiate algebraic and trigonometric functions.
- 5. Apply the concepts of differential calculus to contextual (real-world) situations.
- 6. Understand the definition and basic properties of the Riemann sum.
- 7. Understand the concept of an antiderivative and its role in the Fundamental Theorem of Calculus.

Student Learning Outcomes:

Upon satisfactory completion of the course, students will be able to:

- A. Estimate limits and derivatives graphically and by using tables of values.
- B. Calculate limits of functions algebraically.
- C. Calculate derivatives of functions using the definition of a derivative.
- D. Identify points where a function fails to be continuous or differentiable.
- E. Calculate derivatives of functions using the sum, product, quotient and chain rules.
- F. Determine derivatives of functions using implicit differentiation.
- G. Determine the equation of a tangent line to the graph of a function.
- H. Approximate changes in a function using differentials.
- I. Apply the Intermediate, Mean, and Extreme Value Theorems to a function defined on a closed and bounded interval.

- J. Apply derivatives to problems involving optimization and related rates.
- K. Analyze the behavior of functions and their graphs using first and second derivatives (e.g., determine local and absolute extrema, concavity, and inflection points).
- L. Determine antiderivatives of functions.
- M. Apply the concepts of first and second derivatives and antiderivatives to motion problems.
- N. Calculate a Riemann sum of a function on a closed interval.
- O. Evaluate definite integrals by using the Fundamental Theorem of Calculus.

Topical Outline:

<u>Week</u> 1-2	<u>Topics</u> Review Exponential and Logarithmic Functions Conics
2 - 4	Limits Continuity
5-6	Tangent Lines Derivatives Sum, Product & Quotient Rules
7 - 9	Chain Rule Implicit Differentiation
10 - 11	Related Rates Mean & Extreme Value Theorems First & Second Derivative Tests
12 - 13	Optimization & Motion Problems Antiderivatives
14 - 15	Riemann Sums Definite Integrals Fundamental Theorem of Calculus
16	Final Exam

Calendar:

Methods of Evaluation:

Total Percentage: 0%

The weight given to exams, quizzes, and other instruments used for evaluation will be determined by the instructor.

Methods of Assessment:

Exams, quizzes, homework and other assessments will be used as appropriate to assess student learning.

Methods of Instruction:

Problem-based activities, collaborative-learning techniques, and lecture will be used as appropriate.

Recommended Text:

- Finney, R. L., Weir, M. D., & Giordano, F. R. *Thomas' Calculus Early Transcendentals* 11th Edition, Pearson Addison Wesley, 2003 ISBN: 0321267591
- 2. Larson, R., Hostetler, R., & Edwards, B. *Calculus: Early Transcendental Functions* 4th Edition, Houghton Mifflin Company, 2006 ISBN: 0618606246
- 3. Stewart, J. Calculus 6th Edition, Brooks Cole, 2007 ISBN: 0495011606