MTH 173
Calculus with Analytic Geometry I
COURSE OUTLINE

Prerequisites:
MTH 166 or a placement recommendation for MTH 173 and four units of high school mathematics including Algebra I, Algebra II, Geometry and Trigonometry or equivalent.

Course Description:
Presents analytic geometry and the calculus of algebraic and transcendental functions including the study of limits, derivatives, differentials, and introduction to integration along with their applications. Designed for mathematical, physical and engineering science programs.

Semester Credits: 4  Lecture Hours:4  Lab/Recitation Hours: 0
MTH 173 Calculus with Analytic Geometry I

Course Outcomes

At the completion of this course, the student should be able to:

1. Explain the concepts of the derivative and differentiability.

2. Explain the concepts of limit and continuity.

3. Determine derivatives for appropriate algebraic and transcendental functions.

4. Apply differentiation to solve problems of motion, optimization, and related rates.

5. Apply the first and higher derivatives in determining extrema and concavity of curves for the solution of science and engineering problems.

6. Reconstruction a function from knowledge of its derivative.

7. Understand and evaluate antiderivatives, make substitutions to evaluate integrals of algebraic and transcendental functions.

8. Evaluate definite integrals by definition.


10. Be able to use Maple to solve differential calculus problems.
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Required Materials:

Textbook

Textbook:


The following supplementary materials are available:

1. Student Solutions Manual
2. Software: Maple 9, Waterloo Maple Inc.
## Topical Description:

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### Maple Labs

1. Introduction Lab
2. Limit Lab
3. Position Velocity Acceleration
4. Project
5. Optimization Lab

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Notes to Instructors

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1. Listing of all topics to be included below.
   2 Limits and Continuity
   2.1 Rates of Change and Tangents to Curves
   2.2 Limits of a Function and Limit Laws
   2.3 The Precise Definition of a Limit
   2.4 One-Sided Limits
   2.5 Continuity
   2.6 Limits Involving Infinity: Asymptotes of Graphs
   3 Differentiation
   3.1 Tangents and the Derivative at a Point
   3.2 The Derivative as a Function
   3.3 Differentiation Rules
   3.4 The Derivative as a Rate of Change
   3.5 Derivatives of Trigonometric Functions
   3.6 The Chain Rule
   3.7 Implicit Differentiation
   3.8 Derivatives of Inverse Functions and Logarithms
   3.9 Inverse Trigonometric Functions
   3.10 Related Rates
   3.11 Linearization and Differentials
   4 Applications of Derivatives
   4.1 Extreme Values of Functions
   4.2 The Mean Value Theorem
   4.3 Monotonic Functions and the First Derivative Test
   4.4 Concavity and Curve Sketching
   4.5 Indeterminate Forms and L'Hôpital's Rule
   4.6 Applied Optimization
   4.8 Antiderivatives
   5 Integration
   5.1 Area and Estimating with Finite Sums
   5.2 Sigma Notation and Limits of Finite Sums
   5.3 The Definite Integral
   5.4 The Fundamental Theorem of Calculus
   5.5 Indefinite Integrals and the Substitution Rule

2. Maple labs are optional. However, there should be some kind of “project” given.