



MATH 101
COURSE SYLLABUS

COURSE NUMBER : Math 101
COURSE NAME : Calculus I
CREDITS : 3
PREREQUISITES : Math 91 (Pre Calculus)

CATALOGUE DESCRIPTION:

Limits, Continuous functions. The derivative, formulas of differentiation, differentials. Related rates, Extrema. Rolle's and mean value theorems. Graph sketching Optimization. Indefinite integrals, definite integrals, fundamental theorem of calculus. Applications of definite integrals to find area and volume.

TEXT BOOK : Calculus, 5th Edition
By James Stewart

TOPICS OF THE COURSE

- 1. LIMITS AND CONTINUITY: (8 Hours)**
Introduction to Limits, Definition of Limit, Techniques for Finding Limits, Limits Involving Infinity, Continuous functions.
 - 2. THE DERIVATIVE : (8 Hours)**
Tangent Lines and Rates of Change, Definition of Derivative, Techniques of Differentiation, Derivatives of the Trigonometric Functions, The Chain Rule, Implicit Differentiation, Related Rates, Linear Approximation and Differentials.
 - 3. APPLICATIONS OF THE DERIVATIVE : (9 Hours)**
Extrema of Functions, The Mean Value Theorem, The First Derivative Test, Concavity and the Second Derivative Test, Summary of Graphical Methods, Optimization Problem.
 - 4. INTEGRALS: (8 Hours)**
Antiderivatives, Indefinite Integrals, and Simple Differential Equations
Change of Variables in Indefinite Integrals, Summation Notation and Area, The Definite Integral, Properties of the Definite Integral, The Fundamental Theorem of Calculus
 - 5. APPLICATIONS OF THE DEFINITE INTEGRAL : (8 Hours)**
Area, Solids of Revolution, Volumes by Cylindrical Shells.
- TOTAL (41 Hours)**

LEARNING OBJECTIVES:

1. To provide students with the basic concept of calculus such as continuity and differentiability.
2. To explain the concept of the limit, derivatives and integrals, and interrelate these concepts.
3. To establish connections among calculus topics and “real word” applications.
4. To acquire a corresponding set of tools for finding the integrals of a range of basic functions.

HOMEWORK AND COMPUTER USAGE:

1. A set of problems will be given to students as homework assignments where a subset of those problems is solved by the teaching assistant.
2. No computer related problems are given.

ASSESSMENT METHODS:

1. Quizzes
2. Two Mid-term exams
3. Final exam

LEARNING OUTCOMES:

Students will be able to:

1. Analyze and manipulate functions and sketch the graph of a function in a systematic way.
2. Differentiate function by applying standard rules.
3. Evaluate integrals by means of standard techniques of integration and method of substitution.
4. Achieve the level of mathematical understanding required for studying calculus II (Math 102)

MATH 101- CALCULUS I

CHAPTER 2-LIMITS AND RATES OF CHANGES

(8 Hours)

- 2.2 The Limit of a Function
- 2.3 Calculating Limits Using the Limit laws
- 2.4 The Precise definition of a Limit
- 2.5 Continuity
- 2.6 Tangents and Rates of Change

CHAPTER 3- DERIVATIVES

(8 Hours)

- 3.1 Derivatives
- 3.2 The Derivative as a Function
- 3.3 Differentiation Formulas
- 3.4 Rates of Change (briefly)
- 3.5 Derivatives of Trigonometric Functions
- 3.6 The Chain Rule
- 3.7 Implicit Differentiation
- 3.8 Higher Derivatives
- 3.9 Related Rates
- 3.10 Linear Approximations and Differentials

CHAPTER 4-APPLICATIONS OF DIFFERENTIATION

(9 Hours)

- 4.1 Maximum and Minimum Values
- 4.2 The Mean Value Theorem
- 4.3 How derivatives affect the shape of a Graph
- 4.4 Limits at infinity, Horizontal Asymptotes
- 4.5 Summary of Curve sketching
- 4.7 Optimization Problems
- 4.10 Antiderivatives

CHAPTER 5-INTEGRALS

(8 Hours)

- 5.2 The Definition Integral
- 5.3 The Fundamental Theorem of Calculus
- 5.4 Indefinite Integrals and the Net change Theorem
- 5.5 The Substitution Rule

CHAPTER 6-APPLICATIONS OF INTEGRATION

(8 Hours)

- 6.1 Areas between Curves
- 6.2 Volumes
- 6.3 Volumes by Cylindrical Shells
- 6.5 Average Value of a Function

TOTAL

(41 Hours)