



**MATH 102**  
**COURSE SYLLABUS**

COURSE NUMBER : Math 102  
COURSE NAME : Calculus II  
CREDITS : 3  
PREREQUISITES : Math 101

**CATALOGUE DESCRIPTION:**

Logarithmic and exponential functions. Inverse trigonometric and hyperbolic functions. Techniques of integration. Indeterminate forms and improper integrals. Conic sections. Plane curves and polar coordinates.

**TEXT BOOK** : Calculus 5<sup>th</sup> edition by James Stewart

**TOPICS OF THE COURSE:**

**1. TRANSCENDENTAL FUNCTIONS: (13 Hours)**

The Derivative of Inverse Functions, The Natural Logarithmic Functions, The Exponential Functions, Integration using Logarithmic and Exponential Functions, General Exponential and Logarithmic Functions, Inverse Trigonometric Functions, Hyperbolic Functions & Inverse Hyperbolic Function, Indeterminate Forms and l'Hospital's Rule.

**2. TECHNIQUES OF INTEGRATIONS : (17 Hours)**

Integration by Parts, Trigonometric Integrals, Trigonometric Substitutions, Integral of Rational Functions, Quadratic Expressions and Miscellaneous Substitutions, Improper Integrals, Arc Length, Area of Surface of Revolution and Applications.

**3. PARAMETRIC EQUATIONS AND POLAR COORDINATES : (11 Hours)**

Parametric Equations, Arc Length, Polar Coordinates, Integration in Polar Coordinates, Conic Sections and Conic Sections in Polar Coordinates.

**TOTAL (41 Hours)**

### **LEARNING OBJECTIVES:**

1. Teach the students about techniques of integration in both rectangular and polar coordinates.
2. Introduce the students to new functions obtained by using the theory of inverse 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. Mid-term exams
3. Final exam

### **LEARNING OUTCOMES:**

Students will be able to:

1. Work with some new functions in mathematics and use them for studying phenomena that are investigated in physics, engineering, biology etc.
2. Evaluate a large class of integrals and apply them for calculating lengths of curves and areas of plane regions.

## MATH 102-CALCULUS II

### CHAPTER-7 TRANSCENDENTAL FUNCTIONS (13 Hours)

- 7.1 The Derivative of Inverse Functions
- 7.2\* The Natural Logarithmic Functions
- 7.3\* The Exponential Functions
- 7.4\* General Exponential and Logarithmic Functions
- 7.5 Inverse Trigonometric Functions
- 7.6 Hyperbolic Functions & Inverse Hyperbolic Function
- 7.7 Indeterminate Forms and l'Hospital's Rule.

### CHAPTER-8 TECHNIQUES OF INTEGRATIONS (13 Hours)

- 8.1 Integral by Parts
- 8.2 Trigonometric Integrals
- 8.3 Trigonometric Substitutions
- 8.4 Integral of Rational Functions (including Prob. 55, Page 540)
- 8.5 Strategy of Integration
- 8.8 Improper Integrals (including Comparison test)

### CHAPTER-9 FURTHER APPLICATIONS OF INTEGRATION (4 Hours)

- 9.1 Arc Length
- 9.2 Area of a Surface of Revolution
- 9.3 Applications to Physics and Engineering (Moments and centers of Mass only)

### CHAPTER-11 PARAMETRIC EQUATIONS AND POLAR COORDINATES (11 Hours)

- 11.1 Curves Defined by Parametric Equations
- 11.2 Calculus with Parametric Curves
- 11.3 Polar Coordinates
- 11.4 Areas and lengths in Polar Coordinates
- 11.5 Conic Sections.
- 11.6 Conic Sections in Polar Coordinates

**TOTAL (41 Hours)**