

## Course Syllabi: UMA003 Mathematics - I (L : T : P :: 3 : 1 : 0)

1. **Course number and name:** UMA003 Mathematics – I

2. **Credits and contact hours:** 3.5 and 4

3. **Text book, title, author, and year**

### **Text Books / Reference Books**

- *Thomas, G.B. and Finney, R.L., Calculus and Analytic Geometry, Pearson Education (2007), 9<sup>th</sup>ed.*
- *Stewart James, Essential Calculus; Thomson Publishers (2007), 6<sup>th</sup>ed.*
- *Wider David V, Advanced Calculus: Early Transcendentals, Cengage Learning (2007).*
- *Apostol Tom M, Calculus, Vol I and II, John Wiley (2003).*
  - a. *Other supplemental materials*
    - *Nil*

4. **Specific course information**

a. Brief description of the content of the course (catalog description)

**Applications of Derivatives:** Mean value theorems and their geometrical interpretation, Cartesian graphing using first and second order derivatives, Asymptotes and dominant terms, Graphing of polar curves, Applied minimum and maximum problems.

**Sequences and Series:** Introduction to sequences and Infinite series, Tests for convergence/divergence, Limit comparison test, Ratio test, Root test, Cauchy integral test, Alternating series, Absolute convergence and conditional convergence.

**Series Expansions:** Power series, Taylor series, Convergence of Taylor series, Error estimates, Term by term differentiation and integration.

**Partial Differentiation:** Functions of several variables, Limits and continuity, Chain rule, Change of variables, Partial differentiation of implicit functions, Directional derivatives and its properties, Maxima and minima by using second order derivatives.

**Multiple Integrals:** Change of order of integration, Change of variables, Applications of multiple integrals.

5. **Specific goals for the course**

After the completion of the course, the students will be able to:

- Apply the knowledge of calculus to plot graphs of functions and solve the problem of maxima and minima.
- Determine the convergence/divergence of infinite series, approximation of functions using power and Taylor's series expansion and error estimation.
- Evaluate multiple integrals and their applications to engineering problems.
- Examine functions of several variables, define and compute partial derivatives, directional derivatives and their use in finding maxima and minima.
- Analyze some mathematical problems encountered in engineering applications.

6. **Brief list of topics to be covered**

- Applications of Derivatives
- Sequences and Series
- Series Expansions
- Partial Differentiation

- Multiple Integrals