



## Level Two

### Calculus (2)

Course Code	Course Num.	Course Name	Credit Hours	Lec	Lab	Tut	Prerequisites
MAT	102	Calculus (2)	4	3	0	2	MAT 101

#### *Objectives:*

- The course introduces polar coordinates and polar graphs including curves in the plane and in space, volumes, and lines.
- To develop the basics of the calculus of infinite series, and applications.
- To be able to apply the methods of Numerical differentiation, Numerical approximation (Newton and fixed point), and Numerical integration.

#### *Syllabus:*

- **Parametric Equations and Polar Coordinates:** Plane Curves and Parametric Equations, Calculus and Parametric Equations, Arc Length and Surface Area in Parametric Equations, Polar Coordinates, Calculus and Polar Coordinates, Conic Sections, Conic Sections in Polar, Coordinates.
- **Integration:** Antiderivatives, Sums and Sigma Notation, Improper Integrals, Area, The Definite Integral, Average Value of a Function, The Fundamental Theorem of Calculus, Integration by Substitution, Numerical Integration, Mean Value Theorem for the Integral, The Fundamental Theorems of Calculus.
- **Infinite Series:** Sequences of Real Numbers, Infinite Series, The Integral Test and Comparison Tests, Alternating Series, Estimating the Sum of an Alternating Series, Absolute Convergence and the Ratio Test, The Root Test, Summary of Convergence Tests, Power Series, Taylor Series, Representations of Functions as Series, Applications of Taylor Series, Binomial Series, Differentiation and Integration of Power Series, Taylor and Maclaurin Series, Taylor Expansion of Differentiable Functions and Analysis of the Remainder.

#### *References:*

- **Calculus, Early Transcendental Functions**, Robert Smith, Roland Minton, McGraw-Hill Science Engineering, 2007.
- **Calculus**, O. Swokowski, et al, PWS Pub. Co.; 6th edition (1994).
- **Calculus Early Transcendentals**, C. Henry Edwards, David E. Penney, Prentice Hall, 2008.
- **Schaum's Outline of Calculus**, Elliott Mendelson, Frank Ayres, McGraw-Hill, 1999.

