KINGDOM OF SAUDI ARABIA
AL-IMAM MOHAMMAD BIN SAUD
ISLAMIC UNIVERSITY
FACULTY OF SCIENCES
DEPARTMENT OF MATHEMATICS

المملكة العربية السعودية
جامعة الإمام محمد بن سعودالإسلامية
كلية العلوم
قسم الرياضيات والإحصاء

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:

- To learn different techniques of integration.
- To understand the applications of definite integrals to physics and Engineering.
- To develop the basics of the calculus of infinite series, and their applications.
- To demonstrate ability to work with polar coordinates and parametric equations.

Syllabus:

- **Integration Techniques:** Brief Review of Integration by Substitution, Integration by Parts, Integration of Rational Functions Using Partial Fractions, Trigonometric Techniques of Integration, Integrals involving logarithmic, exponential, and hyperbolic functions, Improper Integrals, Numerical Integration. Applications of definite integrals.
- **Applications of Definite Integrals:** Volumes By slicing, Volumes using Cylindrical Shells, Arc Length and Surface Area, Application to physics and Engineering.
- **Infinite Series:** Sequences of Real Numbers, Convergence and Divergence of Infinite Sequences, Infinite Series, Remarkable Infinite Series (geometric series, p-series, alternating series, telescoping series), Convergence Tests for Positive Series (ratio test, root test, comparison and limit comparison test, integral test), Alternating Series, Absolute and Conditional Convergence, Power Series, Differentiation ad Integration of power series, Taylor and Maclaurin Series, Convergence of Taylor series, Applications of Taylor and Maclaurin Series, Fourier Series, Periodic Functions, Convergence of Fourier Series, Fourier Cosine and Sine Series.
- **Parametric Equations and Polar Coordinates:** Plane Curves and Parametric Equations, Calculus and Parametric Equations, Arc Length and Surface in Parametric Equations, Polar Coordinates, Calculus and Polar Coordinates, Conic Sections, Study of Conic Sections in Polar Coordinates.

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.