



Calculus (3)

Course Code	Course Num.	Course Name	Credit Hours	Lec	Lab	Tut	Prerequisites
MAT	٢٠٣	Calculus (3)	4	3	0	2	MAT 102

Objectives:

- To be able to apply derivatives and integrals to problems of arc length, and curvature.
- To be able to differentiate functions of two and three variables and to find the limits and extrema for multivariable functions;
- To be able to evaluate double and triple integrals in different systems of coordinates.
- To be able to define vector fields; find the line and surface integrals; be familiar with conservative fields and path independence, and use Green's, divergence, and Stokes's theorems.

Syllabus:

- **Vectors and Geometry of Space:** Vectors in Space, Dot Product, Cross Product, Lines and Planes in Space, Cylindrical and Spherical Coordinates.
- **Vector-Valued Functions:** Vector-Valued Functions of one variable, Calculus of Vector Functions, Motion in Space, Curves and Parameterization, Tangent and Normal Vectors.
- **Functions of several variables and Partial Differentiation:** Functions of Several Variables, Limits and Continuity, Partial Derivatives, The Total Derivative, The Gradient and Directional Derivatives, Tangent Plane, Chain Rule, Extrema, Taylor's Series and Approximations for functions of two variables.
- **Multiple Integrals:** Double Integrals in Cartesian Coordinates, Areas and Volumes, Double Integrals in Polar Coordinates, Triple Integrals in Cartesian Coordinates, Triple Integrals in Cylindrical and Spherical Coordinates.
- **Vector Calculus:** Line and Surface Integrals, Curl and Divergence, Green's Theorem, Divergence Theorem, Stoke's Theorem, Some Physical Application of Vector Calculus.

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.
- **Calculus**, L. Hostetler & Edwards, Houghton Mifflin Publisher, 8th (2005).
- **Advanced Engineering Mathematics**, E. Kreyszig, John Wiley & Sons, INC 8th ed (1998).

