NIRMA
UNIVERSITY

Institute:	Institute of International Study
Name of Programme:	BS (CSE)
Course Code:	2MH202
Course Title:	Calculus II
Course Type:	Introductory
Year of introduction:	2023-2024

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Course Learning Outcomes (CLOs):
At the end of the course, the students will be able to –

1. visualise geometry in two- or three-dimensional spaces (BL2)
2. find differentiation of vector valued functions (BL3)
3. describe the behavior of vector fields (BL3)
4. calculate the integrals of vector valued functions (BL3)

Unit	Contents	Teaching Hours (Total 45)
Unit I	**Vector Algebra:** Scalar field, vector field, dot product, cross product, triple product	05
Unit II	**Tracing of Curves:** Coordinate Systems (Cartesian coordinates, polar coordinates, cylindrical coordinates, spherical polar), Tracing of curves (Cartesian, Polar and Parametric curves)	08
Unit III	**Vector Differential Calculus:** Vector valued functions and space curves, Gradient of a scalar function, derivatives of vector valued functions, Directional derivative, Divergence and Curl of a vector function and their physical meanings, Irrotational, Solenoidal and conservative vector fields.	14
Unit IV	**Vector Integral Calculus:** Line integrals, length of a plane curve and space curve, line integral of vector field, fundamental theorem of line integral, independence of path, law of conservation of energy, Green's theorem in the plane, Gauss Divergence theorem, parametric surfaces, Surface Integral, Stokes' Theorem.	18

Tutorial Works:
This shall consist of 15 tutorials based on the syllabus.

Self-Study:
Self-study contents will be declared at the commencement of the semester. Around 10 % of the questions will be asked from the self-study contents.

Suggested Readings/ References:

1. J Stewart, Calculus Early Transcendental; Cengage
2. J Hass, C Heil, M D Weir, Thomas' Calculus; Pearson
3. E Kreyszig, Advanced Engineering Mathematics; John Wiley & Sons
4. B S Grewal, Higher Engineering Mathematics; Khanna Publications