MANGALORE UNIVERSITY

DEPARTMENT OF MATHEMATICS

MSC MATHEMATICS

MTH 504	Multivariate Calculus and Geometry	4 Credits (48 hours)

Course Outcome: Students will have the knowledge and skills to work with level sets, tangent spaces, maxima and minima of several variable functions, to develop theory of integrals – surface integrals, volume integrals etc and Greens theorem, Stoke's theorem , theory of geometry surfaces, Curvatures, Geodesic etc.

Course Specific Outcome: At the end of the course Students will have the knowledge and skills to understand, explain in depth and apply in various situations the concepts -

- Find Level sets and tangent spaces
- Apply Lagrange multipliers method
- Find Maxima and minima on open sets
- Evaluate Line Integrals
- Apply Green's theorem
- Evaluate Surface area, Surface integrals
- Apply Stoke's theorem, the divergence theorem.
- Understand the geometry of surfaces in R^3, Gaussian Curvature, Geodesic.

Unit I

Introduction to differentiable functions, Level sets and tangent spaces, Lagrange multipliers, Maxima and minima on open sets.

(12 Hours)

Unit II

Curves in R^3, Line Integrals, The Frenet-Serret equations, Geometry of curves in R^3.

(12 Hours)

Unit III

Double integration - Green's theorem. Parametrised surfaces in R^3, Surface area, Surfac integrals, Stoke's theorem, Triple integrals, The divergence theorem.

(16 Hours)

Unit IV

The geometry of surfaces in R^3, Gaussian Curvature, Geodesic.

(8 Hours)

References

[1] Sean Dineen, *Multivariate Calculus and Geometry*, 3rd Ed., Springer Undergraduate Mathematics Series, 2014.

[2] Andrew Pressly, *Elementary Differential Geometry*, 2nd Ed., Springer Undergraduate Mathematics Series, 2010.

[3] Walter Rudin, *Principles of Mathematical Analysis*, 3rd Ed., McGraw Hill, New York, 1976.

[4] J. A. Thorpe, *Elementary Topics in Differential Geometry*, Undergraduate Texts in Mathematics, Springer Verlag, 1994.

[5] W. Klingenberg, *A course in Differential Geometry*, Springer Verlag, 1983.