

Course contents:

- Review of differentiability of functions of several real variables, chain rule. Inverse and Implicit function theorems and their applications. Plane and space curves.
- Definitions and examples of manifolds in \mathbb{R}^n , tangent and normal spaces to manifolds in \mathbb{R}^n . Definition and examples of domains with smooth boundary in \mathbb{R}^n . Differentiability of functions defined on manifolds and their derivatives.
- Review of integral calculus on \mathbb{R}^n , Fubini's theorem for change of order in multiple integrations, rectifiable sets, partition of unity and change of variable formula and applications. Surface area and volume of manifolds in \mathbb{R}^n , integration on manifolds in \mathbb{R}^n . Integration by parts formula for domain with smooth boundary.
- Differential forms and their integrations. Green's Gauss's and Stoke's theorem and their applications.

Class and tutorial timings for the course:

- Monday, 4:00 PM to 5:00 PM
- Tuesday, 4:00 PM to 5:00 PM
- Friday, 4:00 PM to 5:00 PM

Credit system for the course:

- 20 marks for homework assignments.
- 30 marks for mid-sem exam.
- 50 marks for end-sem exam.

Grading and attendance policy:

1. There will be relative grading with a minimum threshold for A (Outstanding), D(Marginal) and NP (the Audit pass) grades as per the criteria given below.

- a) The minimum percentage for the award of an “A” grade is 85%.
- b) The minimum percentage for the award of “D” grade is 30%.
- c) The Audit Pass “NP” is awarded if the student’s attendance is above 75% in the class and he/she has obtained at least a “C-” grade.

2. Attendance policy is as per institute rules.

Note: Based on circumstances above evaluation scheme may change.

References for the course:

- 1. M. Spivak, Calculus on Manifolds, CRC Press A Chapman & Hall Book, 1965.
- 2. J. R. Munkres, Analysis on Manifolds, CRC Press A Chapman & Hall Book, reprint-2018.
- 3. W. Rudin, Principles of Mathematical Analysis, McGraw-Hill, 1976.
- 4. C. Bar, Elementary Differential Geometry, Cambridge University Press, 2017.
- 5. S. Kumaresan, A course in differential geometry and Lie Groups, Hindustan Book Agency, 2002.