Information of the course on **Analysis on Manifolds (MA632)** at IIT Ropar, India (First semester, A.Y.: 2024-2025)

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:

- 10 marks for homework assignments.
- 20 marks for class tests. There will be two class tests.
- 30 marks for mid-sem exam.
- 40 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 90%.

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. C. Bar, Elementary Differential Geometry, Cambridge University Press, 2017.