

Semester	AUG 2022
Open to semester	5,7,11,13
Course code	MT3184
Course title	Differential geometry and Lie groups
Credits	4 /
Course Coordinator & participating faculty (if any)	Praphulla Koushik
Nature of Course	Lectures and Tutorials
Pre-requisites	Group Theory, Calculus on Manifolds
Objectives (goals, type of students for whom useful, outcome etc)	<p>You will learn about abstract smooth manifolds in this course. You will learn how to do calculus on these "locally Euclidean topological spaces". You will also learn about Lie groups which are smooth manifolds along with a compatible group structure. This course will build on the previous course Calculus on manifolds from semester 6 and has a sequel called Riemannian Geometry in semester 8.</p> <p>This course is relevant for many research areas in mathematics (Topology, Geometry, Vector bundles, Analysis, PDE, Representation theory, Number theory) and some areas of theoretical physics (Relativity theory and gravitation, Classical mechanics, Quantum mechanics, Particle physics)</p> <p>This course is open for the fourth year BS-MS and second year iPhd students of mathematics as well as physics.</p>
Course contents (details of topics /sections with no. of lectures for each)	<p>Abstract Manifolds, Smooth maps and their derivatives, Tangent spaces, Whitney embedding theorem for compact manifolds, Introduction to Lie groups and Lie algebras, Homogeneous spaces, Immersions and submersions, Vector fields, Statement of Frobenius theorem, Flows and exponential map, Tensor fields, Orientation, Differential forms, Exterior derivatives, Integration on manifolds using differential forms, Stokes theorem</p>
Evaluation /assessment	<p>End-Sem Examination-50%</p> <p>Mid-Sem Examination-30%</p> <p>Others-Quiz 20%%</p>
Suggested readings (with full	1. Foundations of Differentiable Manifolds and Lie Groups:

list of authors, publisher, year, edn etc.)	F.Warner (1983) GTM Springer 2. An Introduction to Manifolds: L. Tu (2011) Springer 3. Introduction to Differentiable Manifolds and Riemannian Geometry: W. M. Boothby (2003) Academic Press 4. A Course in Differential Geometry and Lie Groups: S. Kumaresan (2002) Hindustan Book Agency 5. Introduction to Smooth Manifolds, John Lee, 2003, Springer GTM
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