

Differential Geometry  
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### Program

1. Differential forms on an open sets of  $\mathbb{R}^n$ .
2. The exterior differential and de Rham cohomology of an open set of  $\mathbb{R}^n$ .
3. Basic properties: homotopy invariance, Mayer Vietoris sequence.
4. Integration on smooth chains and Stokes Theorem.
5. Singular (smooth) homology and the de Rham Theorem for open sets in  $\mathbb{R}^n$
6. Examples and applications.
7. Differential manifolds and Lie groups. Basic facts.
8. The de Rham cohomology for differentiable manifolds.
9. Singular (smooth) homology and the de Rham theorem for differentiable manifolds.
10. Examples and applications.

Lecture notes covering all topics above will be available.

There is a very rich literature on the subject. We suggest at an elementary level

1. do Carmo: Differential Forms and applications, Univeritext, Springer Verlag, 1994,
2. Madsen and Tornehave: From Calculus to Cohomology, Cambridge University Press, 1997,

and, at a more advanced one,

3. Bott and Tu: Differential Forms in Algebraic Topology, Springer Verlag, 1982,
4. Bredon: Topology and Geometry, Springer Verlag 1993

### Prerequisites

1. Basic linear algebra.
2. Differential and integral calculus for functions of several variables.
3. Basic General Topology (metric spaces is enough).