Differential forms and application in geometry and physics

At a first glance, differential forms (also known as co-vectors) might seem as just a technical tool. Locally, 1-dimensional differential forms look just as the dual of vectors, which everybody is familiar with. However, differential forms capture some very deep global geometric- and topologic properties of the space they are attached to. Therefore, differential forms led to the discovery of a vast number of new results in area such as differntial-, symplectic-, contact- and algebraic geometry, algebraic topology, classical- and quantum mechanics, just to name a few. The course will be an introduction into differential forms.

Prerequisites: We will assume knowledge only in calculus in R^n (differentiation and integration). However, it would also be desirable, but not compulsory, some basic knowledge in: smooth manifolds, algebraic topology and differential geometry of surfaces.

References: M. do Carmo, Differential forms and applications, Springer1991 J. M. Lee, Introduction to Smooth Manifolds, Springer 2006 R. Bott and L. W. Tu, Differential Forms in Algebraic Topology, Srpinger 1982