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Abstract:

Intuitively, a foliation corresponds to a decomposition of a manifold (higher dimensional analogue of a curve and a surface) into a union of connected; disjoint submanifolds of the same dimension, called leaves, which locally form layers of a Euclidean space. A foliation always appears as the family of solutions to some nonsingular system of differential equations. The study of the global aspects of foliations goes back to H. Poincaré, to the end of 1880's. In the search for a geometric investigation of the study of differential equations he proposed a qualitative study of the solutions. This qualitative study belongs to the realm of *topology*-in todays language- in which one tries understand the characteristics of solutions not through numerical, but through topological investigations. These efforts culminated in the theory of *dynamical systems*. After the pioneering work of H. Poincaré and some other mathematicians, the theory of foliations, as it is known, began with the work C. Ehreshman and G. Reeb, in the 1940's. Since then the subject has rapidly developed to a wide field of research.

In this talk for general audience, we shall outline fundamental notions about foliations, present examples and sample results-classical and recent- pointing out the relations with the other branches of mathematics and some other sciences, giving an idea about the role topology plays. Emphasis will be on 3 and 4 dimensional manifolds because of the connections with some recent developments in these dimensions.