Balázs Csikós: Curvature and topology

Curvature is a central notion of differential geometry. It refers to various quantities that measure the deviation of a geometrical object from a "flat" object of the same type. Curvature at a point is a *local* invariant, sensitive for continuous deformations.

Topology, however, is interested in those properties of objects, that are invariant under continuous deformations. As geometrical objects of the same type (e.g. two curves or two surfaces) have the same local structure from the viewpoint of topology, topological invariants reflect information on the *global* structure of the objects.

Though curvature at a point is a local invariant, the knowledge of the curvature at each point of an object provides strong global information which controls the global shape, in particular the global topology of the object. Thus, one can expect that topological invariants can be expressed as integrals of curvature invariants, and restrictions on the curvature can give restrictions on the topology. The aim of the lectures is to present theorems of this flavour on the interaction between curvature and topology.

Prerequisites: We are going to give the definition of all the notions that will be used, but those who have some background in the differential geometry of curves and surfaces and in the theory of smooth manifolds, will probably follow the lectures easier.