

FDITE11 Differential geometric methods in physics

lecturer: László Fehér

Topics:

The goal of the course is to outline some differential geometric structures that are used in modern treatments of general relativity, Yang-Mills theory and analytical mechanics. First the basic notions of manifolds, exterior forms, tensor fields, Lie groups, Riemann manifolds etc. will be exposed. Then, phase spaces (symplectic and Poisson manifolds), Hamiltonian systems, their symmetries and reduction methods will be treated. Finally, the elements of fibre bundles and the theory of connections will be presented, with applications to field theory.

Recommended literature:

- V.I. Arnold: Mathematical methods of classical mechanics, second edition, Springer-Verlag, 1989.
- J.E. Marsden, T.S. Ratiu: Introduction to mechanics and symmetry, second edition, Springer-Verlag, 1999.
- B.A. Dubrovin, A. T. Fomenko, S. P. Novikov: Modern geometry - methods and applications, Vols. I and II, Springer-Verlag, 1985.