Title:
A geometric introduction to manifolds

Abstract:
Manifolds are everywhere! They are natural generalization of the Euclidean space. They appear not only in geometry and topology, but in many areas of sciences, such as theoretical physics, biology and structure engineering. For example, curves and surfaces are examples of one- and, respectively, two-dimensional manifolds. Also, the space-time we live in is a four-dimensional manifold and the DNA in our body is modelled by a very special two-dimensional manifold called the helicoid.
The course will provide a basic and very geometric introduction to manifolds.

Structure:
Lecture 1 – An intuitive approach towards the concept of manifold. Definition and (many!) examples.
Lecture 2 – The shape of space: how can we distinguish between two given manifolds? Topology versus geometry of a surface.
Lecture 3 – Soup bubbles and soap films: how can we predict the shape of a soap film?

Prerequisite:
The course will be as self-contained as possible and is designed not for mathematical trained students but for general scientifically interested students. Only very elementary concepts of analysis and function theory will be required such as: continuity, differentiations, and inverse of a function, as well as some basic Euclidean geometry, and a lot of imagination!

References:
M. do Carmo – *Differential geometry of curves and surfaces*, Prentice-Hall Inc., 1976
O' Neill – *Elementary differential geometry*, Elsevier 2016
E. Abbena, S. Salamon, A. Gray – *Modern differential geometry: curves and surfaces with Mathematica*, Chapman and Hall/CRC, 2006