Introduction to Differential Geometry
Mth-519, Fall 2011

Differential geometry is a mathematical discipline that uses the methods of differential and integral calculus, as well as linear algebra, to study problems in geometry. A fundamental contribution to the theory of surfaces was made by Gauss in 1825. His papers contain practical calculations of the curvature of the earth based purely on measurements on the surface of the planet. He considered properties of surfaces which are determined only by the geodesic distances between points on the surface independently of the particular way in which the surface is located in the ambient Euclidean space. This led to his Theorema Egregium, a fundamental result which explains why there cannot be an accurate planar map of the world.

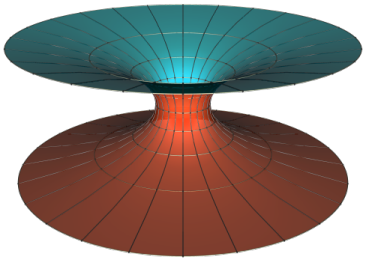

Figure 1: Catenoid

Beautiful surfaces can be created by playing with soap bubbles, a family of minimal surfaces that will be studied in this class. The above picture is the famous "catenoid" already studied by Euler. Other examples of minimal surfaces can be seen at:

`http://www.indiana.edu/~minimal/maze/classical.html`.

In the applied world, Differential geometry allows to design shapes that are used in the everyday life, and is helpful when looking for a minimal path on curve surfaces. In physics, differential geometry allows to describe complicated physical systems leading to the Lagrangian formalism and general relativity. The success of these theories made of Differential geometry one of the fundamental tools in modern physics.

Time and Place:
August 29 - December 12, 2011
M, W 4:40-6:20pm
College of Staten Island, 1S-217

Prof. Marcello Lucia
College of Staten Island, 1S-226
marcello.lucia@csi.cuny.edu
`http://www.math.csi.cuny.edu/~mlucia/`