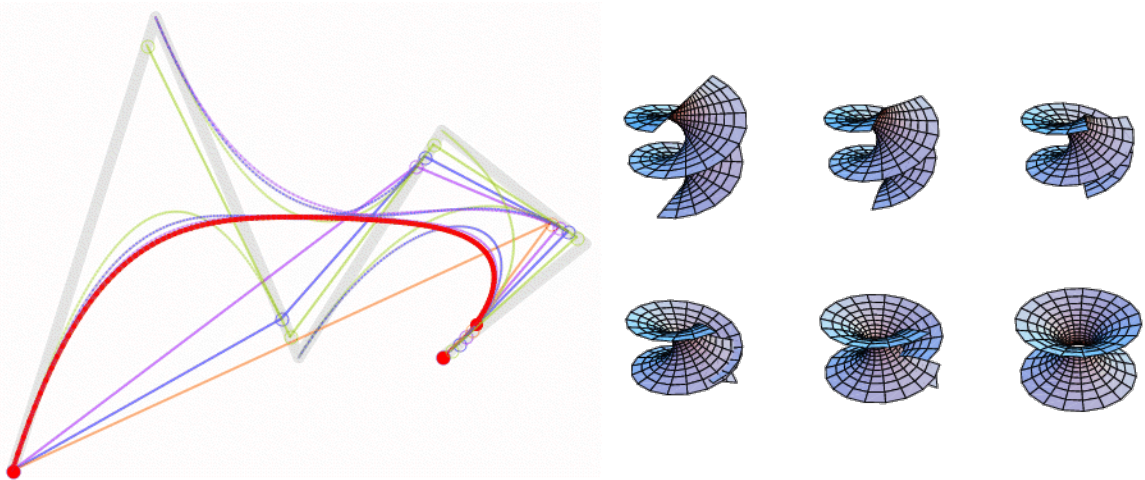# TATA74 DIFFERENTIAL GEOMETRY

Differential Geometry is a problem-solving course with many applications to mechanics, modeling, design and computer aided design. For instance the Bézier curves and surfaces developed in 1962 by Pierre Bézier at Citroen. Another example is minimal surfaces, like soap bubbles, which have specially nice properties.

Differential Geometry is also an integrating course that provides intuitive examples for many concepts in linear algebra, calculus and differential equations. These examples are fundamental to physics and mechanics: they play a role in our understanding of the movements of particles.

Course contents: Curves: tangents, curvature and torsion. Contact. Different types of curves. Regular surfaces: tangent plane. The first fundamental form: normal and geodesic curvature. Geodesics and parallel transport. Gauss' formulae. The second fundamental form: Weingarten's equation, principal, Gauss and mean curvature. Minimal and developable surfaces. Riemann's and Ricci's tensors, Codazzi-Mainardi's equations. Gauss' "Theorema Egregium". Isometrical and conformal mappings. Gauss-Bonnet theorem.

Course literature: A. Pressley: Elementary Differential Geometry (Springer-Verlag)
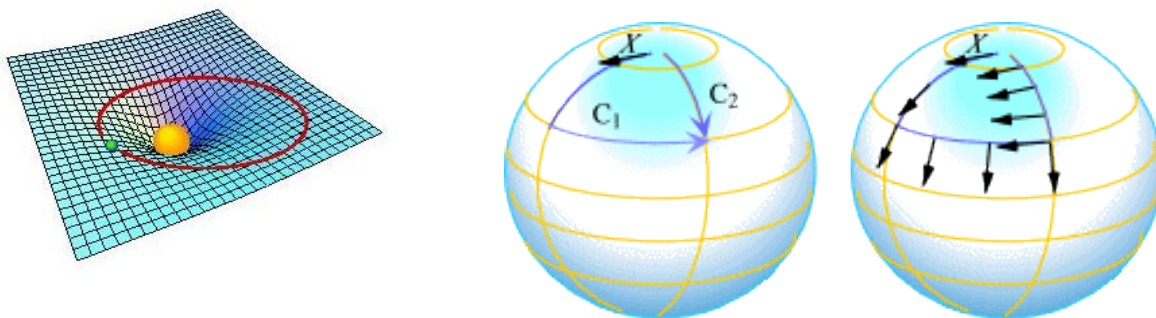
For more information contact Milagros Izquierdo