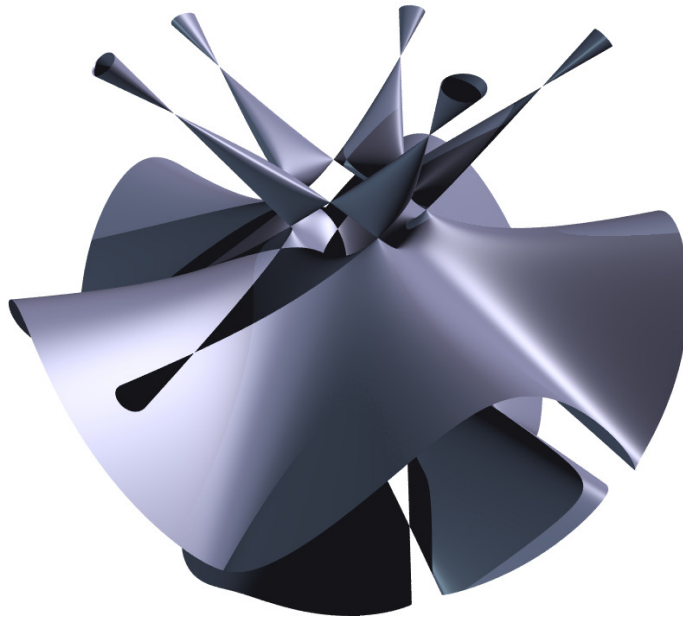**Arizona State University**
MAT 494, Spring 2017
Instructor: Julien Paupert

Introduction to Differential Geometry

This course will provide an introduction to the language and tools of classical Differential Geometry and Geometric Topology by focusing on the 2-dimensional case of surfaces.

Prerequisites: MAT 371 (Advanced Calculus) required, MAT 410 (Introduction to General Topology) recommended, specifically the notions of compactness, connectedness and quotient topology. (Ask instructor for more details and possible overrides). This class counts as an Upper Division Depth Course.

Topics: Time permitting, we plan to cover the following topics:

- **Topology of surfaces:** Polygonal presentations; topological manifolds; Triangulations, cell complexes, Euler characteristic; Orientability; Topological classification of compact surfaces.

- **Differential Geometry of Surfaces:** Smooth surfaces, tangent spaces, differentials; Local and Global Riemannian metrics on surfaces; Isometries; Geodesics.

- **The Gauss-Bonnet Theorem: where Geometry meets Topology:** The Gauss map, Gaussian curvature, Gauss' Theorema Egregium; total curvature of geodesic triangles; the Gauss-Bonnet theorem. Constant curvature metrics on surfaces (spherical, Euclidean or hyperbolic).