



Math 412

Introduction to Differential Geometry

Spring 2013

Instructor: David Maxwell (damaxwell@alaska.edu)

Differential geometry is a branch of mathematics that lies at a meeting point somewhere between calculus and geometry. In Math 412 we will study the classical geometry of curves and surfaces living in three-dimensional space. Topics will include the properties of curves and surfaces, notions of curvature, and the connection between curvature and topology. Our goal is to enjoy the beauty of this classic theory and to develop the intuition required to understand modern differential geometry. To this end we will use the Maple software package as a visualization tool and to assist with computations.

Modern differential geometry is an active research field in both pure mathematics and theoretical physics. A unifying theme of the last 100 years of physics is the important role that differential geometry and its cousins play in describing the universe at all scales, from the quantum to the cosmological. Although we will be able to see just a hint of what these ideas are all about in Math 412, the class will be an excellent departure point for future study.

Initial Meeting Time: MWF 11:45-12:45pm (possibly adjustable)

Text: **Differential Geometry and Its Applications**,
John Oprea, MAA Edition

Prerequisites: Math 314 (Linear Algebra) and either Math 401
(Introduction to Real Analysis) or Math 421 (Applied
Analysis) or instructor permission (See me!).