Differential Geometry

MATH 434/534 Section 001

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Required Text: John Oprea Differential Geometry and its Applications, 2nd ed.

About the Course: In this course we will study the differential geometry of curves and surfaces in $\mathbb{R}^3$. This study entails finding invariants that describe the “shape” of the curve or surface. For example in the case of curves, the “curvature” describes how much the curve deviates from a straight line, how much it “curves”. The “tortion” of a curve describes how much the curve twists out of a plane. In the case of surfaces in $\mathbb{R}^3$ the “curvature” describes the surface, and there are relations with the global topology of the surface. The epitome of this relationship is the famous Gauss-Bonnet Theorem which expresses the integral of the curvature over the surface in terms of a topological invariant, the Euler characteristic.

One reason for choosing the book that I did was the Maple programs that are incorporated. Although not a requirement, I do want to encourage the students to run some of these programs. I will supplement the material in the book with my own material as well as material from other texts.

Grading Policy: I will make periodic homework assignments, including a project due at the end of the semester. Grades for the class will be based on these homework assignments and class participation.

Qualified students with disabilities needing appropriate academic adjustments should contact me as soon as possible to ensure your needs are met in a timely manner. Handouts are available in alternative accessible formats upon request.