UNIVERSITY OF BRITISH COLUMBIA

MATH 424 Section 201 January-April 2019

# Classical Differential Geometry

**Description:** The course is on differential geometry of curves and surfaces in $\mathbb{R}^3$, with an emphasis on the surface theory. We will introduce some basic concepts, such as the curvature of a curve, the tangent plane, the differential of a map, differential forms, the first and the second fundamental forms, mean curvature and Gaussian curvature, Gauss map and vector fields, parallel transport, and geodesics. We will study Gauss' Theorema Egregium and the Gauss-Bonnet Theorem.

**Prerequisites:**

1. Linear Algebra: Either (a) a score of 68% or higher in MATH 223 or (b) a score of 80% or higher in one of MATH 152, MATH 221; and
2. Vector Calculus: Either (a) a score of 68% or higher in MATH 227 or (b) a score of 80% or higher in one of MATH 217, MATH 263, MATH 317.

**Textbook:** *Differential Geometry of Curves and Surfaces: Revised and Updated Second Edition*, by Manfredo P. do Carmo, Dover Publications.

Sections to be (tentatively) covered:

- Chapter 1 : 1.1, 1.2, 1.3, 1.4, 1.5, 1.7
- Chapter 2 : 2.1, 2.2, 2.3, 2.4, 2.5, 2.8
- Chapter 3 : 3.1, 3.2, 3.3, 3.4, 3.5B
- Chapter 4 : 4.1, 4.2, 4.3, 4.4, 4.5

**Grading:**

- Five biweekly homework assignments (75%) due Thursdays 01.17, 01.31, 02.14, 03.07, and 03.21.
- One take-home final exam (25%) due Thursday 04.04.

**Policies:**

1. Assignments and take-home exam are to be handed in in class on Thursdays. Late homework will be accepted but a 25% discount will be applied for each day late, using 4pm as the cut-off time.

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**homepage:** `http://www.math.ubc.ca/~ttsai/courses/424-19Q1/`