

# MATHEMATICS 138A

## INTRODUCTION TO DIFFERENTIAL GEOMETRY I

**Text:** *Differential Geometry of Curves and Surfaces*, by M. Do Carmo

Topics covered include the elementary local theory of curves and surfaces, and the first and second fundamental forms.

TOPICS	SUGGESTED NO. OF WEEKS' COVERAGE
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Curves ..... 2 (§§ 1.1–1.5, 1.7A)	
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Frenet's trihedron and the fundamental theorem of the local theory of curves, isoperimetric inequality.

Regular surfaces ..... 2 (§§ 2.1–2.6)	
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Regular surfaces and their first fundamental forms, tangent planes, areas, orientations.

The Gauss map and the second fundamental form ..... 4 (§§ 3.1–3.3, 3.5, 4.1–4.4, 4.6, 5.4)	
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The Gauss map, the second fundamental form, Gaussian curvature, equations of compatibility and the statement of the fundamental theorem of the local theory of surfaces, minimal surfaces, mean curvature and the first variational formula for area. Parallel transport, geodesic, exponential map.

Midterm 30%, Final 50%, Homework 20%.