

Professor Fine
LARTS-396E
910-6905
dfine@umassd.edu

MTH451/551 Syllabus

Spring 2022

Elements of Differential Geometry R. Millman & G. Parker

Week of 1/17:

Introduction
Review of linear algebra & vector calculus

Week of 1/24:

Tuesday is Add/Drop/Audit deadline
Regular curves, tangent vectors, reparametrization
Arc length
Curvature

Week of 1/31:

Frenet-Serret data
Frenet-Serret theorem

Week of 2/7:

Fundamental theorem of curves
Simple surfaces: open sets, coordinate patches
Tangent planes, unit normals

Week of 2/14:

Presidents' Day *No class on Tuesday*
Parametric (coordinate) curves
Surfaces: coordinate patches

Week of 2/21:

Presidents' Day *No class on Tuesday*
Pass/Fail deadline is Wednesday
Tangent spaces
The metric (first fundamental form)

Week of 2/28:

Normal curvature
Midterm exam
Mid-semester is Friday

Week of 3/7:
Spring Break

Week of 3/14:
Geodesic curvature
Gauss's formulas
Geodesics

Week of 3/21:
Parallel transport
Second fundamental form
Directional derivatives & the Weingarten map

Week of 3/28:
Principal curvatures
Gaussian curvature & mean curvature
Paper topic due

Week of 4/4:
Riemannian curvature
Withdrawal deadline is Friday
Gauss's equations & the Codazzi-Mainardi equations

Week of 4/11:
Gauss's *Theorema Egregium*
Angular variation
Gauss-Bonnet formula
Draft of paper due

Week of 4/18:
Patriots' Day: *Class does meet Tuesday*
Euler characteristic
Gauss-Bonnet theorem
Student presentations

Week of 4/25:
Student presentations
Paper due
Last class is Tuesday