

Lecture Plan

Name of the College: Government College of Arts, Science and Commerce, Sanquelim-Goa

Name of Faculty: Minoshka D'Souza

Subject: Mathematics

Paper code: MAT-6004

Program: MSc Mathematics

Division: -

Academic year: 2026-27

Semester: III

Total Lectures: 60

Course Objectives: The aim of the course is to study curves in two and three dimensions and surfaces in three dimensions

Expected Course Outcome: On completion of this course the learner will be familiar with curves in two and three dimensions and surfaces in three dimensions

Student Learning Outcome: On completion of this course the learner will be able to

1. Recall and explain concepts related to curves in the plane and space, curvature of curves, surfaces in three dimensions, the first fundamental form, the second fundamental form, curvature of surfaces and Gaussian curvature
2. Prove important theorems in differential geometry
3. Apply knowledge gained to solve basic problems in differential geometry.
4. Analyze, compare and differentiate between various concepts in differential geometry in order to solve problems

Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
June	22/06/2026	27/06/2026	4	Curves in the Plane and in Space: Curves, Arc-Length, Reparametrization	Problem solving on topics covered	Latex, GeoGebra	Elementary Differential Geometry by Andrew Pressley
June/July	29/06/2026	04/07/2026	4	Curves in the Plane and in Space: Reparametrization, Level Curves vs Parametrized Curves How Much Does a Curve Curve?: Curvature, Plane Curves	Problem solving on topics covered	Latex, GeoGebra	Elementary Differential Geometry by Andrew Pressley
July	06/07/2026	11/07/2026	4	How Much Does a Curve Curve?: Plane Curves, Space Curves	Problem solving on topics covered	Latex, GeoGebra	Elementary Differential Geometry by Andrew Pressley
July	13/07/2026	18/07/2026	4	How Much Does a Curve Curve?: Space Curves Global Properties of Curves: Simple Closed Curves, Isoperimetric Inequality	Problem solving on topics covered	Latex, GeoGebra	Elementary Differential Geometry by Andrew Pressley
July	20/07/2026	25/07/2026	4	Global Properties of Curves: Isoperimetric Inequality, Four Vertex Theorem Surfaces in Three Dimensions: Definition and Examples	Problem solving on topics covered	Latex, GeoGebra	Elementary Differential Geometry by Andrew Pressley

July/August	27/07/2026	01/08/2026	4	Surfaces in Three Dimensions: Examples, Smooth Surfaces, Tangents	Problem solving on topics covered	Latex, GeoGe bra	Elementary Differential Geometry by Andrew Pressley
August	03/08/2026	08/08/2026	4	Surfaces in Three Dimensions: Normals and Orientability, Examples, Quadric Surfaces	Problem solving on topics covered	Latex, GeoGe bra	Elementary Differential Geometry by Andrew Pressley
August	10/08/2026	15/08/2026	3	Surfaces in Three Dimensions: Quadric Surfaces, Triply Orthogonal Systems	Problem solving on topics covered	Latex, GeoGe bra	Elementary Differential Geometry by Andrew Pressley
August	17/08/2026	22/08/2026	4	Surfaces in Three Dimensions: Applications of the Inverse Function Theorem	Problem solving on topics covered	Latex, GeoGe bra	Elementary Differential Geometry by Andrew Pressley
August	24/08/2026	29/08/2026	4	The First Fundamental Form: Lengths of Curves on Surfaces, Isometries of Surfaces	Problem solving on topics covered	Latex, GeoGe bra	Elementary Differential Geometry by Andrew Pressley
August/ September	31/08/2026	05/09/2026	4	The First Fundamental Form: Conformal Mappings of Surfaces, Surface Area	Problem solving on topics covered	Latex, GeoGe bra	Elementary Differential Geometry by Andrew Pressley
September	07/09/2026	12/09/2026	4	The First Fundamental Form: Equi-area Maps and a Theorem of Archimedes Curvature of Surfaces: The Second Fundamental Form	Problem solving on topics covered	Latex, GeoGe bra	Elementary Differential Geometry by Andrew Pressley
September	14/09/2026	19/09/2026	0	Ganesh Chaturti Break	Problem solving on	Latex, GeoGe bra	Elementary Differential Geometry by Andrew Pressley

					topics covered		
September	21/09/2026	26/09/2026	4	Curvature of Surfaces: The Curvature of Curves on a Surface, The Normal and Principal Curvatures	Problem solving on topics covered	Latex, GeoGebra	Elementary Differential Geometry by Andrew Pressley
September/ October	28/09/2026	03/10/2026	4	Gaussian Curvature and the Gauss Map: The Gaussian and Mean Curvatures, The Pseudosphere	Problem solving on topics covered	Latex, GeoGebra	Elementary Differential Geometry by Andrew Pressley
October	05/10/2026	10/10/2026	4	Gaussian Curvature and the Gauss Map: Flat Surfaces, Surfaces of Constant Mean Curvature	Problem solving on topics covered	Latex, GeoGebra	Elementary Differential Geometry by Andrew Pressley
October	12/10/2026	14/10/2026	3	Gaussian Curvature and the Gauss Map: Gaussian Curvature of Compact Surfaces, The Gauss map	Problem solving on topics covered	Latex, GeoGebra	Elementary Differential Geometry by Andrew Pressley

*** Assessment Rubrics**

Component	Max Marks
ISA 1	15
ISA 2	15
Mid Point Exam	30
Semester End Exam	40