

# Course Description

Department of Mathematics

Nature of the course <input type="checkbox"/> required <input checked="" type="checkbox"/> elective		Area 麻煩老師勾選類別，或直接填寫_____。 <input type="checkbox"/> 代數與數論 <input type="checkbox"/> 分析 <input checked="" type="checkbox"/> 幾何與拓樸 <input type="checkbox"/> 計算與應用數學 <input type="checkbox"/> 機率 <input type="checkbox"/> 統計 <input type="checkbox"/> 離散數學 <input type="checkbox"/> 其他 <input type="checkbox"/> 論文研討、獨立研究			
Calculus <input type="checkbox"/> Calculus A <input type="checkbox"/> Calculus B					
Course number		Section number	免填	Number of credits	3
Course title	課程名稱：微分幾何一 Differential Geometry (I)				
Instructor	教授：蔡忠潤				
開設學期： <input checked="" type="checkbox"/> 上學期 <input type="checkbox"/> 下學期 <input type="checkbox"/> 全學年		上課時間： 星期    節次		開課對象： <input type="checkbox"/> 大學生 <input type="checkbox"/> 研究生 <input checked="" type="checkbox"/> 皆可	

## I. \* Contents :

1. smooth manifolds (coordinates, vector fields, Lie derivatives, tangent bundles, vector bundles, differential forms, tensors, etc.)
2. basic Riemannian geometry (geodesics, exponential map, curvature, etc.)
3. Hessian and Laplacian, Hodge theory.

## II. Course prerequisite :

1. point-set topology
2. familiar with linear algebra
3. advanced calculus, in particular, Taylor theorem and inverse/implicit function theorem
4. fundamental theory of ordinary differential equation: existence and uniqueness, smoothness of solutions in initial conditions

## III. \* Reference material ( textbook(s) ) :

1. Taubes, *Differential geometry. Bundles, connections, metrics and curvature.*
2. do Carmo, *Riemannian geometry.*
3. Cheeger and Ebin, *Comparison theorems in Riemannian geometry.*
4. Warner, *Foundations of differentiable manifolds and Lie groups.*

## IV. \* Grading scheme : 請填寫各項計分之百分比，例如：期中 30% 期末 40% 作業 10% 報告 20%，總計 100%

Homework 30%, Midterm 30%, Final 35%, Course participation 5%.

## V. \* Course Goal :

Provide an essential foundation in differential geometry, and the idea about how to use calculus/analysis to study geometry.

1. \*號為必填欄位
2. 大綱內容字數英文最少 200 字以上