

# 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：微分拓樸 Differential Topology				
Instructor	教授：蔡忠潤				

## I. \* Contents :

1. Sard's theorem and transversality argument.
2. Morse function.
3. Degree, Poincare--Hopf theorem, framed cobordism and Hopf theorem.
4. Vector bundles, Thom isomorphism and Euler class.
5. Chern classes and Pontrjagin classes.

## II. Course prerequisite :

1. General Topology (topological spaces, product topology, quotient topology and quotient maps, continuity, compactness, connectedness).
2. Differentiable manifolds (tangent spaces, differential maps, differential forms).
3. Basic algebraic topology (homology group and its Mayer--Vietoris sequence).

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

1. Morris Hirsch, Differential topology.
2. John Milnor, Topology from the differentiable viewpoint.
3. John Milnor Differential topology. (1958 Princeton lecture notes by James Munkres)
4. John Milnor, Morse Theory.
5. Raoul Bott and Loring Tu, Differential forms in algebraic topology.
6. Victor Guillemin and Alan Pollack, Differential topology.

## 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%

1. Homework 30%.
2. Midterm 30%.
3. Final exam/report 30%.
4. Course participation 10%

## V. \* Course Goal :

The main purpose of this course is to emphasize how to study the topology of smooth manifolds and smooth vector bundles using differentiable techniques.