

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：微分幾何專題(二)，Topics in Differential Geometry II				
Instructor	教授：丘成桐				

I. * Contents :

1. Eigenvalues and eigenfunctions: the relation between the geometry and eigenvalue estimates, the relation between the length spectrum, the nodal set of eigenfunctions.
2. Heat kernel estimate: gradient estimate and Harnack inequality under certain curvature condition.
3. Conformal deformation of scalar curvature; conformal invariant from conformal maps to the spheres and balanced immersions, with applications to the first eigenvalue estimate; analogous for holomorphic immersions into projective spaces.
4. The structure of manifolds with positive scalar curvature: surgeries, spin cobordism, the method of minimal submanifolds.

II. Course prerequisite :

1. Differentiable manifolds, and basic knowledge about the (co)homology and fundamental group.
2. Riemannian metric: geodesic and exponential maps.

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

1. R. Schoen and S.-T. Yau, Lectures on differential geometry.
2. Some research papers will be given during the lecture.

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. Course participation: 20%.
2. Homework: 80%.

V. * Course Goal :

This course is a continuation of Topics in Differential Geometry. The main theme of this class is to study the geometry using methods of analysis. In particular, we plan to focus on the eigenvalues and the scalar curvature.