課程簡介
COURSE DESCRIPTION
DEPARTMENT OF MATHEMATICS
NATIONAL TAIWAN UNIVERSITY

- **Academic Year:** 1st Semester, 103rd Academic Year
- **Nature of the Course:** Elective
- **Area:** Geoemtry and Topology
- **Number of Credits:** 2
- **Course Title:** Topics in Algebraic Geometry 代數幾何專題
- **Instructor:** Wu-yen Chuang 莊武諺

I. **Contents:** Hilbert schemes of points, framed moduli space of torsion free sheaves on $\mathbb{P}^2$, hyper-Kähler metric, resolution of simple singularities, McKay correspondence, Poincaré polynomials of the Hilbert schemes, Hilbert scheme on the cotangent bundle of a Riemann surface, homology group of the Hilbert schemes and the Heisenberg algebra, Nakajima basis, vertex algebra, and so on.

II. **Course Prerequsite:** Much experience in algebraic geometry.

III. **References:** Hiraku Nakajima, Lectures on Hilbert Schemes of Points on Surfaces, AMS University Lecture Series. Other references will be supplemented along the way.

IV. **Grading Schemes:** 35% homework assignments, 35% course participation, 35% oral presentation or term paper.

V. **Course Goal:** The purpose of the course is to discuss various properties of the Hilbert schemes of points on surfaces. Hilbert scheme is an object of interests in algebraic geometry, and it is also related to many other branches of mathematics, such as singularities, symplectic geometry, representation theory and theoretical physics. I will lecture on Nakajima's classic on this subject and try to relate these subjects in harmony.

The lectures will be delivered in Chinese.

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