

Xin Fu - Oral Qualify Syllabus

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complex geometry

1Complex manifolds

- Stokes' Theorem
- De Rham and Dolbeault Cohomology
- Resolution of sheaf
- Dolbeault Theorem
- Submanifold and Subvariety

2Kahler manifold

- Hodge decomposition for Kahler manifold
- Kodaira-Serre Dualiry
- Kodaira Vanishing Theorem
- Holomorphic connection
- Curvature of Line Bundles
- Adjuction Formula
- Chern Class of Line Bundle
- Poincare-Lelong formula
- Blow Up of a Point
- Calabi-yau theorem

3Compact Algebraic Surface

- Intersection Numbers
- Zariski's lemma of intersection numbers on algebraic surface
- Riemann-Roch for Curves and Surface
- Ample Divisor, Nef Divisor and Big Divisor
- Kodaira's lemma for big divisor
- Neother Formula
- Castelnuovo (-1) Curve Contracting Theorem
- Hirzebruch Surface
- Configuration of singular fiber of elliptic surface
- Local construction of Elliptic Surface

Several Complex Variables

- Cauchy Integral formula in polydiscs, Cauchy Estimate
- Hartogs Extension Theorem
- Bochner's Extension Theorem
- Properties of Subharmonic Functions and Plurisubharmonic Functions
- Domain of Holomorphy
- Reinhardt Domain
- Pseudoconvexity
- Holomorphic convex

L2 Estimate and Multiplier Ideal Sheaf

- L 2Estimate on Compact Kahler Manifold
- Multiplier Ideal Sheaf and Nadel Vanish Theorem
- Kodaira embedding though jets.

References

- [1] P.Griffiths and J.Harris, Principles of Algebraic Geometry.
- [2] K.Kodaira, Compact Analytic Surface.
- [3] L.Hormander, Introduction to Several Complex Variables.
- [4] J.P.Demailly, Analytic Methods in Algebraic Geometry.