

Topics in algebra and geometry. Transcendental methods in complex geometry (Junyan Cao).

The goal of this course is to give an introduction to the transcendental aspect of complex geometry. We will start by recalling briefly

the notions of connection, curvature, and Cherns classes on holomorphic vector bundles, which are closely related to Toulisse and Höring's courses. Then we will focus on the Hodge theory and its applications in complex geometry such as Hard lefschetz theorem, Kodaira vanishing theorems. In the last part, we will discuss its generalization in singular metric setting and its recent applications in complex geometry.

The following references may be useful

- (1) Demailly, *Complex analytic and differential geometry* - available on his homepage.
- (2) Demailly, *Analytic Methods in Algebraic Geometry* Higher Education Press, Surveys of Modern Mathematics, Vol. 1, 2010, - available on his homepage.
- (3) Höring. *Kähler Geometry and Hodge theory* - available on his homepage.
- (4) Huybrechts. *Complex Geometry* - Springer 2005.
- (5) Voisin. *Théorie de Hodge et géométrie algébrique complexe*. Vol 10 of Cours Spécialisés, SMF, 2002.