Complex Geometry - Student Seminar

Ernesto C. Mistretta

Timetable: First seminar on Monday April 4th, 2022, Torre Archimede, Room 2BC/60
Requirements: Basic differential geometry and topology.
Aim: Have a view on complex geometry, in particular Hodge Theory and its applications in Algebraic Geometry.

Seminar contents:

1. BOLUWATIFE JOSHUA ADERINTO 04/04 at 17.15 in room 2BC/60 - Holomorphic functions: - review on holomorphic functions of 1 complex variable - holomorphic functions of several complex variables: definition, properties, difference with 1 variable case.

- INTERLUDE (Mistretta): linear algebra of complex and real vector spaces.

2. GIOELE BERTO 11/04 at 17.15 in room 1BC/45 - Complex manifolds: - complex atlas - vector bundles - real tangent bundle / holomorphic tangent bundle - differential forms and differential operators
3. MASSIMO OSTUZZI 22/04 at 14.30 - Kaehler manifolds: - Hermitian metrics and Kaehler metrics - Connections - Chern form - Fubini-Study metric on the projective space
4. LUCA COLLAUTO 29/04 at 14.30 - Sheaves: - definition of sheaves - cohomology of sheaves - relationship with singular cohomology and de Rham cohomology

- INTERLUDE (Mistretta): a toy case for harmonic forms and cohomology.

5. LUCIA TESSAROLO 02/05 at 17.15 in room 2BC/60 - Harmonic forms: - adjoint operators and Laplacians - elliptic differential operators - harmonic forms
6. LORENZO SCHIAVONE 09/05 at 17.15 in room 2BC/60 - Hodge decomposition: - Kaehler identities - Hodge decomposition for compact Kaehler manifolds - Hodge Index Theorem
7. KIN LOK LI 16/05 at 17.15 in room 2BC/60 - Hodge structures: - Hodge structures and polarisations - Kodaira embedding theorem
8. DONATO QUICCIONE 20/05 at 14.30 in room 2AB/45 - De Rham complexes, spectral sequences, hypercohomology
9. EMANUELE RONDA 23/05 at 17.15 in room 2BC/60 - Cycle classes, Chern classes, Poincaré duality
10. MARCO GIUSTETTO 30/05 at 17.15 in room 2BC/60 - Hodge conjecture

Zoom link:

- https://unipd.zoom.us/j/82468773306?pwd=MkJkdmFkbGZhWWZqTHZDTnQ2a2c0Zz09
- Meeting ID: 824 6877 3306 - Passcode: 282522

Bibliografy:

- Claire Voisin “Hodge Theory and Complex Algebraic Geometry (part I)”, Cambridge University Press.

- Daniel Huybrechts “Complex Geometry: An Introduction”, Springer.
- Phillip Griffiths, Joseph Harris “Principles of Algebraic Geometry”, Wiley.