

1 Seminar on Complex Surfaces

Introduction, general properties of surfaces and examples.

- 21-11-14 (Joey): Introduction to the subject and overview. Definition of main invariants. [1] I.7, VI.1, [6] 10.6.3-10.6.7
- 28-11-14 (Ralph): Hodge decompositions on surfaces. [1] IV.2;
- 5-12-14 (Davide): " b_1 even implies Kähler" part I: [1] IV.3 & [2] I.2 and III.1,2.
- 12-12-14 (Joey): " b_1 even implies Kähler" part II: [1] IV.3 & [2] I.2 and III.1,2.
- 23-01-15 (Ralph): Line bundles and divisors, Projectivity of surfaces. [3] I.1 [4] II.4 [1] I.6, IV.6
- 30-01-15 (Joey): Projectivity continued. [1] IV.6.
- 06-02-15 (Joey): Bimeromorphic transformations. [1] III.1-4
- 13-02-15 (Davide): Minimality, Hironaka's example. [1] III.4, [8] Appendix B.
- 20-02-15 (Michael): Elliptic fibre bundles, higher genus fibre bundles [1] V.5,6.
- 27-02-15 (Davide): , \mathbb{P}^2 (Yau's theorem) and complete intersections. [1] V.1,2.
- 06-03-15 (Ralph): Quotients: Godeaux and Hopf. [1] V.15,18.
- 13-03-15 (Joey): Ruled surfaces [1] V.4, [7] III.
- 20-03-15 (Joey): Albanese Torus, ruled surfaces continued. [1] I.13, V.4, [7] III
- 27-03-15 (Ralph): Elliptic fibre bundles [1] V.5.
- 10-04-15 (Joey) Fibrations: general properties and relative duality [1] III.8,11,12.
- 17-04-15 (Joey) Elliptic fibrations: Kodaira's table of singular fibers [1] II.8, V.7. [9] I.4, I.6.
- 24-04-15 (Joey) Elliptic fibrations: Canonical bundle formula [1] V.12

Classification

- 01-05-15 (Davide): Surfaces with nef canonical bundle [1] IV.5,7
- 15-05-15 (Davide): Rationality and Castelnuovo's theorem [1] VI.3
- 29-05-15 (Ralph): The case $a(X) = 2$. [1] VI.4
- 12-06-15 (Ralph): The case $a(X) = 1$. [1] VI. 5
- 19-06-15 (Joey): The case of $a(X) = 0$. Final conclusions. [1] VI.6,7.

References

- [1] Barth, Hulek, Peters, Van de Ven: Compact complex surfaces
- [2] Demailly: Complex analytic and differential geometry

- [3] Griffiths & Harris: Principles of algebraic geometry
- [4] Ueno: classification theory of algebraic varieties and compact complex spaces
- [5] Wells: Differential analysis on complex manifolds
- [6] Grauert & Remmert: Coherent analytic sheaves
- [7] Beauville: Complex algebraic surfaces
- [8] Hartshorne: Algebraic geometry
- [9] R.Miranda: The basic theory of elliptic surfaces