

COMPLEX GEOMETRY

SOMMERSEMESTER 2014

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## 1. CLASSICAL RESULTS IN ONE COMPLEX VARIABLE

- 1.1. **The Cauchy-Riemann Equations.**
- 1.2. **Runge, Mittag-Leffler, Weierstrass Theorems.**

## 2. HOLOMORPHIC FUNCTIONS OF SEVERAL VARIABLES

- 2.1. **The Cauchy Integral Formula.**
- 2.2. **The Hartogs Extension Theorem.**
- 2.3. **Subharmonic and Plurisubharmonic Functions.**
- 2.4. **Holomorphic Convexity and Pseudoconvexity.**
- 2.5. **Stein Manifolds.**

## 3. COMPLEX SPACES

- 3.1. **Analytic Sets, Weierstrass Preparation Theorem.**
- 3.2. **Presheaves, Sheaves, complex spaces.**

## 4. VECTOR BUNDLES AND CONNECTIONS

- 4.1. **Connections and Curvature.**
- 4.2. **Kähler metrics, Kähler Identities.**
- 4.3. **Bochner-Kodaira-Nakano formula.**
- 4.4. **Line bundles, divisors and blowing-up.**

## 5. SHEAVES AND COHOMOLOGY

- 5.1. **Acyclic Resolutions.**
- 5.2. **The De Rham-Weil Isomorphism Theorem.**

## 6. HODGE THEORY

- 6.1. **Elliptic Differential Operators.**
- 6.2. **Harmonic Forms and Cohomology.**
- 6.3. **Hodge Decomposition on Kähler manifolds.**

## 7. POSITIVE VECTOR BUNDLES AND VANISHING THEOREMS

- 7.1. **Bochner-Kodaira Vanishing Theorem.**
- 7.2. **Kodaira Embedding Theorem.**

8.  $L^2$  ESTIMATES FOR  $\bar{\partial}$ 

- 8.1. Estimates on complete Kähler manifolds.
- 8.2. Positive Currents, singular Hermitian Metrics.
- 8.3. Nadel Vanishing Theorem.
- 8.4. Ohsawa-Takegoshi Extension theorem.

## 9. THE BERGMAN KERNEL

- 9.1. Asymptotic Expansion.
- 9.2. Convergence of the induced Fubini-Study metrics.
- 9.3. Scalar curvature and projective embeddings.
- 9.4. Distribution of zeros of random sections.