The University of Western Ontario Department of Mathematics Math 9607 COMPLEX ANALYTIC GEOMETRY

PRESENTATION TOPICS FOR WINTER 2025

1. One-dimensional analytic sets

1.1. Puiseux Theorem. [Chirka, Łojasiewicz]

2. Proper mappings

- 2.1. Theorem on injective holomorphic maps $f : \mathbb{C}^n \to \mathbb{C}^n$. [d'Angelo]
- 2.2. Theorem on nonexistence of proper holomorphic maps from a polydisc to a ball. [d'Angelo]

3. Normalization

- 3.1. Notions of normal space and normal point of an analytic space. Algebraic characterisation of normality of a point (in terms of the local ring at the point). Analyticity of the non-normal locus. [Lojasiewicz]
- 3.2. Theorem on the codimension of the singular locus of a normal space. [Lojasiewicz]
- 3.3. Existence of a local (and hence, global) normalization of a complex analytic space. [Lojasiewicz]

4. Analyticity vs. algebraicity

- 4.1. Chow Theorem on analytic sets in projective spaces. [Lojasiewicz]
- 4.2. Rudin Theorem on algebraicity of analytic sets. [Chirka, Łojasiewicz]
- 4.3. Chevalley Theorem on images of algebraically constructible sets. [Lojasiewicz]
- 4.4. Theorem on (global) analytic irreducibility of irreducible algebraic sets. [Lojasiewicz]

Suggested sources:

- 1. E. M. Chirka, "Complex analytic sets", 46. Kluwer Academic Publishers Group, Dordrecht, 1989.
- J. P. d'Angelo, "Several complex variables and the geometry of real hypersurfaces", CRC Press, Boca Raton, 1993.
- 3. S. Lojasiewicz, "Introduction to Complex Analytic Geometry", Birkhäuser, Basel, 1991.