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Here is a brief overview of some of the topics we will cover: a review of classical Hodge theory, simplicial resolutions, the filtered de Rham complex of a singular variety, vanishing theorems, Du Bois and rational singularities and recent refinements of these notions, Bernstein-Sato polynomials and minimal exponents, applications to higher dimensional complex geometry.

I will assume some familiarity with fundamental algebraic geometry, roughly at the level of Hartshorne's book plus the first two chapters in Griffiths-Harris, and also some basic familiarity with various notions of positivity for line bundles, as in Ch. 1 and 2 in Lazarsfeld's book. A bit of knowledge of Hodge theory as in the first volume of Voisin's book, and basic singularities as in Kollár-Mori, would be helpful.

Course structure:

I am not planning to have homework sets or an exam. There will be however various exercises scattered throughout the lectures, and you are certainly encouraged to do them. For undergraduates or beginning graduate students however, we may need to find an accommodation involving some homework and/or a small reading project for a grade -- the main point is to get something out of the class, regardless of the level.