

## Math 538-001 - Yi Hu

### *Topics on Birational Geometry and Singularities.*

In this topics course, we will discuss some basic techniques on resolution of singularities in algebraic geometry. Along the way we will also discuss some very interesting geometric realizations of arbitrary singularity types.

We plan to cover (at least) the following topics.

1. Resolutions for singular curves. This includes various classical methods and modern techniques.
2. Resolution for surfaces. This includes many enlightening examples.
3. Resolution in characteristic zero. This provides the general method in characteristic zero and includes the idea of principalization.
4. We will also discuss the Mnev Universality, a beautiful geometric realization of an arbitrary singularity type as a scheme of configurations of points in the projective plane
5. In the first meetings, I will discuss with the students for possibly additional topics. The course is open to other related topics that the students want to learn.

Prerequisite: Math 536A or the equivalent.

#### References:

1. Lectures on Resolution of Singularities (AM-166). János Kollár.
2. Mnev-Sturmfels universality for schemes. R. Vakil and S. H. Lee, in "A celebration of algebraic geometry", 457-468, Clay Math. Proc., 18, Amer. Math. Soc., Providence, RI, 2013.