

On singularities of maps

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The aim is to introduce graduate students to methods and problems in the study of singularities of mappings. Lectures will cover

1. Examples, and basic terms: critical points and critical values, Thom-Boardman singularities. Basics of analytic geometry - though without systematic use of sheaves; normal and non normal varieties.
2. Notion from commutative algebra: dimension, depth and Cohen-Macaulay rings.
3. Generic behavior, jet bundles and Thom's transversality theorem.
4. Left-right equivalence of analytic map-germs, left-right tangent spaces, and Damon's Theorem identifying left-right equivalence with \mathcal{K}_D -equivalence of sections of stable discriminants.
5. Use of infinitesimal methods to prove finite determinacy and versality theorems.
6. The geometry and topology of deformations: conservation of multiplicity and μ versus τ .
7. Multiple points by means of Fitting ideals (in the target) and by residual intersections (in the source).
8. Free divisors and logarithmic vector fields and differential forms.

I will provide exercises, and will run problem classes if students want.