106936: Topics in Analysis 3

M. Zhitomirskii

The course will be devoted to

Normal Forms in Local Analysis

Main topics:

1. Normal forms for vector fields (non-linear autonomous systems of ODEs).

Linearization theorem. Resonance normal form. Center-focus problem. Andronov-Hopf bifurcation.

2. Normal forms for functions.

Families of functions of one variable. Normalization methods. A-D-E singularities.

3. Basic notions of singularity theory.

Generic objects. Simple objects. Modality. Codimension of singularities. Germs and jets. Transversality theorem. Catastrophy machine (we will play it!)

4. Singularities of plane curves.

Literature:

1. Bruce, Giblin, *Curves and singularities*

2. Poston, Stewaret, *Catastrophe theory and its applications*

3. Arnol'd, Varchenko, Gusein-Sade, *Singularities of differentiable mappings*

These books are difficult, the course will be much more accessible than any book.

Required background: good knowledge of INFI

Grade: Homeworks and understanding of main concepts (oral test): 60 points; Project to ne made during the course: 15 points. The written test (25 points) will hold on the last 2-hour scheduled meeting.