Introduction. Phylosophy of generic position

Generic dynamical systems in the plane. Limit behavior of solutions; Andronov-Pontryagin criterion of structural stability; Poincare-Bendixson theorem

Elements of hyperbolic theory. Hadamard - Perron theorem; Smale horseshoe; elements of symbolic dynamics; Anosov diffeomorphisms of a torus and their structural stability; Grobman-Hartman theorem; normal hyperbolicity and persistence of invariant manifolds.

Attractors. Lyapunov stability of equilibrium points and periodic orbits; maximal attractors and their fractal dimension; strange attractors; Smale-Williams solenoid.

Dynamical systems in low dimension. Diffeomorphisms of a circle; rotation number, periodoc orbits; conjugacy to rigid rotation; flows on a torus; density; uniform distribution.

Elements of ergodic theory. Survey of measure theory; invariant measures of dynamical systems; Krylov-Bogolyubov theorem; Birkhoff-Khinchin ergodic theorem; ergodicity of nonresonant shifts and Anosov diffeomorphisms of a torus; geodesic flows; mixing.

Time permitting, some new results in attractors and hyperbolic theory will be presented.

About 2/3 of the course will be covered by the books of Arnold "Geometric Methods in the Theory of ordinary differential equations" and Katok and Husseblatt, "Introduction to the Modern Theory of Dynamical Systems". Some part will be covered by lecture notes.

Grading policy. There will be beweekly take home assignments, that will count for 80% of the entire grade. The last home work will be a take home final exam counting 20% for the grade.