The goal is to present an introduction to dynamical system using prototype examples that highlight typical dynamical behaviors.

In certain cases we will provide a quick glimpse on the subject without getting into details.

1. One-dimensional real dynamics
   (a) circle homeomorphisms and diffeomorphisms.
   (b) Rotation number; aperiodic dynamics and Morse-Smale; Arnold family.
   (c) Expanding endomorphisms.
   (d) Critical endomorphisms.
   (e) Stability results for one dimensional dynamics.
   (f) A short introduction to ergodic theory and what is possible to say in one dimensional dynamics.
   (g) Dynamics with zero entropy; Sharkoski and the boundary of zero entropy.
   (h) Qudratic family: stochastic and simple dynamics.
   (i) Few words on renormalization.
   (j) Newton's method.
   (k) A few words about one-dimensional complex dynamics.
2. Hyperbolic dynamics
   (a) A short introduction to hyperbolic dynamics through examples: the horseshoes, Anosov diffeomorphisms, Solenoid and other hyperbolic attractors.
   (b) The key features and ingredients in hyperbolic dynamics.
   (c) The stability conjecture and some results.
3. Beyond hyperbolic dynamics.
   (a) Homoclinic tangencies and Newhouse's phenomena on surfaces.
   (b) Non-uniform hyperbolicity on surfaces; Henon attractor.
   (c) Dominated splitting and Partially hyperbolic dynamics.
   (d) Blenders.
   (e) Robust transitivity and Stable ergodicity.
   (f) Phenomenas and mechanisms; typical homoclinic bifurcation on the complement of hyperbolic dynamics.
4. A few words on flows.
   (a) Anosov flows.
   (b) Geodesic flows on manifold with negative curvature.
   (c) Lorenz attractors.

5. A few words on conservative and Hamiltonian dynamics.

   (a) Some examples on Hamiltonian dynamics; the pendulum, two and many body problems.

   (b) A glimpse into KAM theory.

   (c) A very short introduction to Arnold's diffusion.