

# Dynamical systems (Dinamikai rendszerek)

core course for Mathematics MSc and Applied Mathematics MSc students,  
elective course for students interested in the theory of Dynamical Systems  
(eg. Mathematics BSc, Physics MSc, or PhD students in Mathematics, Physics or Engineering).

3/1/0/v/5, Neptun: BMETE93MM02, T0 and T1

**Instructor: PÉTER BÁLINT**

Spring 2024

**Monday, 14.15-16.00,**

**Tuesday, 16.15-18.00**

This is an introductory course to the mathematical theory of dynamical systems. The main objective is to study chaotic dynamical systems, both from a topological, and from a statistical/ergodic theoretical perspective. The course aims to provide a systematic introduction to the theory by focusing on simple, yet typical examples (eg. one dimensional maps, shift maps, CAT maps, Smale's horseshoe, solenoidal attractors). In particular it will be investigated in what sense *deterministic time evolution may lead to the emergence of stochastic phenomena*. In addition to their mathematics interest, such questions are important for a host of applications (in physics, biology, information theory, engineering, meteorology, economics etc.)

Main topics planned:

- Dynamical systems in discrete and continuous time, examples;
- Introduction to topological dynamics;
- Introduction to ergodic theory;
- One dimensional maps;
- Local theory of equilibria;
- Bifurcations;
- Hyperbolic dynamical systems;
- Attractors;
- Symbolic dynamics;
- Entropy;
- Thermodynamic formalism.

Homepage: <http://www.math.bme.hu/~pet/dynsyst>