Instructor: Dr. Zoltán Buczolich.

Text: No official text. Recommended textbooks: Robert L. Devaney: An introduction to chaotic dynamical systems. Second edition. AddisonWesley Studies in Nonlinearity. AddisonWesley
D. Lind and B. Marcus: An introduction to symbolic dynamics and coding. Cambridge University Press, Cambridge, 1995.
Falconer, Kenneth Fractal geometry. Mathematical foundations and applications. Second edition. John Wiley & Sons, Inc., Hoboken, NJ, 2003.

Prerequisites: A standard course in Calculus I and II. Some knowledge of metric spaces and differential equations.

Class meetings: Tue. 16:00-18:00, ELTE Déli Tömb, 3-110. First class meeting is on September 12. Between October 16 and November 10 I will be at the Mittag Leffler institute in Stockholm to participate in a program "Fractal geometry and dynamics" (this means that 3 class meetings will be canceled during this period, we will make it up during the semester, but be prepared that there might be make up classes and/or longer class meetings during other weeks of the semester).

Office Hours: Tue. 13:30-15:30 and by appointment (first office hour is on September 12). My office at the Eötvös University is in Room 3-305 in ELTE Déli Tömb. My office phone number is: 372-2500 extension 8516, email: `buczo@cs.elte.hu`. During this semester I am on a (partial) sabbatical leave with reduced teaching and with main workplace at the Rényi Institute. Our class schedule at the time of writing this information sheet is not final, this means that, with a not too much probability, some of the above information might change. Send me an email in case you are interested in this course, this way I will be able to send you updated information.

Midterm: during the week November 13-17 exact time and location will be announced later (closed book, two hour exam).

Final: during the period December 11-13 exact time and location will be announced later (open book, two hour exam).

Grading: 30% Midterm, 20% Homework, 50% Final.

Homework: You are expected to work on all regular homework assignments. Some problems will be denoted by an *. These problems are somewhat harder and you should try to solve them but they are not mandatory practice problems. You can earn extra credit by solving them. Your homework grade will be based upon the graded problems. Selected homework problems will be graded only and I will not give in advance the information which ones.

Make up tests: Make up exams will not be given. In case you miss the midterm for a valid reason alternate grading: 40% Homework, 60% Final.

Detailed Syllabus: Contractions, fixed point theorems. Examples of Dynamical Systems: Newton's method, interval maps, the quadratic family, differential equations, rotations of the circle. graphical analysis. Hyperbolic fixed points. Cantor sets as hyperbolic repelling sets. Sequence spaces as metric spaces. Symbolic dynamics and coding. Dynamical systems and fractals. Hausdorff measure and dimension. Iterated functions systems: existence of the attractor, relationship with dynamical systems. Topological transitivity, sensitive dependence on initial conditions, chaos/chaotic maps, structural stability, period three implies chaos. The Schwarzian derivative. Bifurcation theory. Period doubling.