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.

K. Falconer: 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: Mon. 16:00-17:40, ELTE Déli Tömb 00-115. First class meeting is on September 10. Between September 30 and October 6 I will be at a conference in Germany to make up this lost class meeting instead of 90 we will have 100 minute class meetings during the rest of the semester. (Keep in mind that October 22 is part of a long weekend holiday, and October 29 is part of the Eotvos university Fall break so on these two Mondays there will be no classes.)

Office Hours: Mon. 14:30-15:30, Tue. 14:30-15:30 and by appointment (first office hour is on September 10).

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`. 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 12-17 exact time and location will be announced later (closed book, two hour exam).

Final: during the period December 10-18 exact time and location will be announced later (open book, two hour exam).

Grading: 35% Midterm, 25% Homework, 40% 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.