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: Wed. 16:00-17:40, ELTE Déli Tömb 0-412. First class meeting is on September 11. Between September 16 and September 20 I will be at a conference in Poland 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 30 is part of the Eotvos university Fall break so on this day there will be no class.)

Office Hours: Mon. 16:30-17:30, Tue. 14:00-15:00 and by appointment (first office hour is on September 9).

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@caesar.elte.hu`. Send me an email in case you are interested in this course, this way I will be able to send you updated course information and contact you during the semester.

Midterm: during the week November 11-15 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.