Applied Dynamical Systems 1MA151.

Course Webpage:
`http://www.math.uu.se/~gaidash/1MA151/1MA151.html`

Lecturer:
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Objectives of the course:

1) Understand the fundamental concepts of the dynamical systems, specifically:
   - dynamics of the quadratic family,
   - topological dynamics; recurrence, mixing and transitivity,
   - stable and unstable manifolds, homoclinic and heteroclinic intersections, horseshoes,
   - fractals,
   - one and two dimensional flows, phase space, limit cycles and Poincaré-Bendixson Theorem,
   - bifurcations in flows and maps.
2) Understand and be able to explain/present applications of the theory in biology, physics and engineering.
3) Solve representative problems in the above-mentioned topics.
4) Carry out numerical studies of dynamical systems.

Textbooks:
Primary text: Steven H. Strogatz, *Nonlinear Dynamics And Chaos: With Applications To Physics, Biology, Chemistry, And Engineering (Studies in nonlinearity)*, Publisher: Westview Press 2001-01-19, 512 Pages, ISBN: 0738204536.

Bits and pieces from:

1 M. Brin, G. Stuck, *Introduction to Dynamical Systems*, Cambridge University Press 2002. Available for purchase as e-book at `www.cambridge.org`.

2 M. W. Hirsch, S. Smale, R. L. Devaney, *Differential Equations, Dynamical Systems and an Introduction to Chaos*, Academic Press (Elsevier) 2004.

3 A. Katok, B. Hasselblatt, *Introduction to the Modern Theory of Dynamical Systems*, Cambridge University Press 1995, partially freely available at Google Books, `www.books.google.com`.

4 Kathleen T. Alligood, Tim Sauer, James A. Yorke. *Chaos: an introduction to dynamical systems*, Springer, 1996, partially freely available at Google Books, `www.books.google.com`.

Grading:
There will be 3 homeworks, which will account for 45% of the final grade. The first one is due on **Nov. 11th**.

There will be also a final, 3 hours, 55% of the final grade.

The purpose of this scheme is spread the risks over the length of the course.