MTH744U/MTH744P Dynamical Systems 2012-2013

Level 7, Semester A

Lecturer: Dr T. Prellberg (Mathematics)

Lecture times: Thursday 11-12 and 12-1 (Maths 203)

Exercise class:
Thursday 3-4 (Maths 203)

Office hours: Thursday 1:30-2:30 (Maths B51)

Weekly exercise routine: Exercises available on Monday from the web page
`http://www.maths.qmul.ac.uk/~tp/MTH744U/`

Attendance: Attendance registers will be taken during lectures. We will terminate college registration of students who fail to attend regularly.

Test/revision week: There will be no teaching in week 7.

Calculators: Calculators may NOT be used in the final examination.

Assessment: 100% final examination

Syllabus

1. First-order differential equations (one-dimensional flows): linear and nonlinear equations, graphical solutions, bifurcations.
2. Two-dimensional flows: phase plane, stability of fixed points, periodic solutions, and limit cycles. Introduction to bifurcation theory, local and global bifurcations. Tools for studying global behavior of flows: Lyapunov functions, Poincare-Bendixson Theorem, gradient flows.
3. Three-dimensional flows: Lyapunov exponents, Poincare sections, strange attractors, chaos.

Textbook

- Nonlinear Dynamics and Chaos: with applications to physics, biology, chemistry, and engineering, Steven H. Strogatz, Westview Press, 1994

Thomas Prellberg, September 2012