LTCC Basic Applied Course

- Title: **Applied Dynamical Systems**

- Basic Details:
  - Core Audience: Applied Mathematics
  - Course Format: Core (10h)

- Course Description:
  - Keywords: time-discrete maps, periodic points, topological conjugacy, Bernoulli shift, symbolic dynamics, deterministic chaos, invariant measures, Ljapunov exponents, dynamical entropies, fractals, deterministic diffusion, escape rate formalism, anomalous diffusion.
  - Synopsis: This course introduces the basic concepts of time-discrete dynamical systems by studying simple one-dimensional maps. These systems will be characterised in terms of periodic orbits and by introducing fundamental dynamical systems quantities like Ljapunov exponents and dynamical entropies. Important techniques for understanding the dynamics like topological conjugacy and symbolic encoding with be explained. These concepts will be applied in order to rigorously analyze deterministic diffusion, which defines a fundamental problem of modern statistical physics and is a topic of recent research.

- Recommended reading:
  - C. Beck, F. Schloegl, *Thermodynamics of Chaotic Systems: An Introduction* (CUP, 1995).
  - R. L. Devaney, *An Introduction to Chaotic Dynamical Systems* (Westview Press, 2003)
  - K. T. Alligood, T. D. Sauer, J. A. Yorke, *Chaos* (Springer, 1996)
  - J. R. Dorfman, *An Introduction to Chaos in Nonequilibrium Statistical Mechanics* (CUP, 1999)
- Format:
  - No. of problem sheets: 1 (optional)
  - Electronic lecture notes: yes
  - Necessary support facilities: none
  - Necessary software requirements for computing facilities: None
  - Proposed timing: late Spring 2010

- Lecture details:
  - Lecturer: Dr Rainer Klages, QMUL