

Course Announcement:

Interactions between Dynamics and PDE

Lecturer: **Christian Kuehn**

Basic Information

- More detailed title: **Interactions between Dynamical Systems and Partial Differential Equations.**
- Where? - **TU Munich**, FIM, Boltzmannstr. 3, room: MI 03.06.011.
- When? - **17.10.2016 - 11.02.2017** (excluding Christmas break), every **Friday, 10-12 & 14-16**.
- Language? - The course will be given in **English**.
- Target audience? - **Master's students** as well as: advanced BSc students, doctoral students.
- Background? Some basics of ODEs and PDEs are helpful (i.e. a first course in each topic).
- Duration & Type? 3 SWS Lecture + 1 SWS Exercises. A two-hour exercise session every other week from 14-16; the other afternoon session mixes lectures and/or background material tailored to the participants.
- Evaluation? - Depending on the number of participants, the exam will be either **oral** or **written** at the end of the course.
- Lecture Notes? - There will be **lecture notes** prepared for the course.

Course Content

The course provides an introduction to results and methods at the interface between dynamical systems and partial differential equations. In particular, basic ideas will be covered to transfer techniques from ordinary to partial differential equations.

Several concrete classes of partial differential equations arising in applications in the natural and engineering sciences will be covered. A focus will be on dynamical systems aspects, i.e., qualitative and quantitative properties of solutions will be discussed. Planned topics are:

- bifurcation theory (Lyapunov-Schmidt reduction, local bifurcations),
- travelling waves (existence, stability, propagation speed),
- pattern formation (amplitude equations, spiral waves),
- typical effects (dissipation, dispersion, blow-up),
- further topics (conservation laws, spike solutions, ...).

The choice of further topics will be adapted to the interest and background of the audience. In particular, we shall try to build up a toolbox useful for different courses, thesis work or further research projects.

Website

All relevant communication beyond this overview will be posted on the course website, including lecture notes, announcements, and so on. So please make sure to check the following website frequently:

http://www-m8.ma.tum.de/personen/kuehn/courses/fall2016_DynamicsPDE.html