PhD course “Aggregation-Diffusion Equations”

Lecturer: *Marco Di Francesco*

The course covers the mathematical theory of a class of evolution partial differential equations with applications in biology, social sciences, and real-world applications combining nonlocal aggregation and nonlinear diffusion. The course will start with a focus on the applications for this class of PDEs. Then, the mathematical theory for the purely nonlocal case will be presented, with special focus on the related interacting particle systems (ODEs). The diffusive theory will be then covered with the use of the Wasserstein gradient flow theory and the Jordan-Kinderlehrer-Otto scheme. Time permitting, we will deal with some results on the asymptotic behavior (steady states, large time decay, blow-up).

The course will start on Wednesday March 21 at 14:30 in room A1.6. The schedule will be very flexible and decided on the spot, or via mailing list. The course will most likely continue through the spring-summer term and continue in the next fall term.

Prerequisites: Calculus in many variable, ODE theory, basic PDE theory, basic measure theory.