PhD Course on
Mathematical models of biological self-organisation

Prof. Pierre Degond (Imperial College London)

Self-organisation happens when agents interacting through local rules generate largescale coherent structures. Self-organisation occurs across all scales in living systems from the molecular to the ecosystem scale through the cellular and organism scales. Across these scales, a formidable variety of self-organisation mechanisms exist.

However, some common features emerge, which suggest the possibility of analysing self-organisation through a few 'universal' models. These models must have a minimal number of parameters to lend themselves to mathematical and numerical investigations and hence provide valuable insights into the underlying biological phenomena.

Identifying and studying these models will provide new paradigms to understand living systems and fight pathologies such as infections or cancer.

In this course, we will discuss a certain number of self-organisation mechanisms and models giving particular emphasis on:

- alignment in self-propelled particles and symmetry-breaking phase transitions;
- network formation models;
- the transition from compressible to incompressible dynamics.

Schedule

Tuesday 2 April:	14:00 - 16:00
Wednesday 3 April:	16:00 - 18:00
Thursday 4 April:	10:00 - 12:00
Friday 5 April:	10:00 - 12:00

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Next event:
"The Mechanics of Cell Aggregates: Experiments and Models" - workshop - 4-6 September 2019

Past event:
"Asymptotic homogenization in biology" - workshop - 25 June 2018