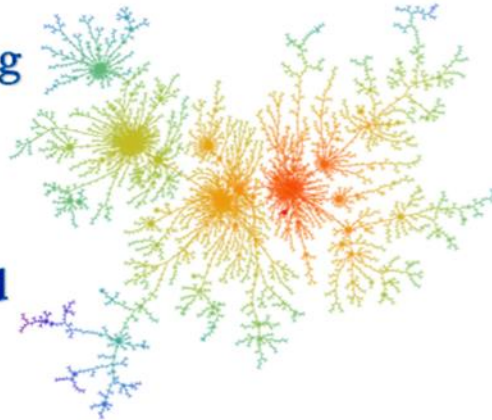# Centre For Doctoral Training

MATHEMATICS OF RANDOM SYSTEMS
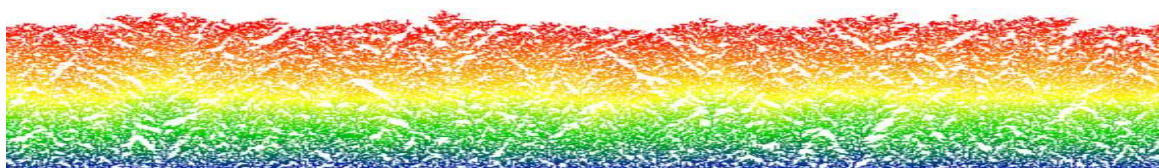## Analysis, Modelling and Algorithms

The **CDT in Mathematics of Random Systems** is a partnership between three world-class departments in the area of probabilistic modelling, stochastic analysis and their applications -the Oxford Mathematical Institute, the Oxford Department of Statistics and the Department of Mathematics, Imperial College London- with the ambition of training the next generation of academic and industry experts in stochastic analysis, stochastic modelling, advanced computational methods and Data Science.

The CDT offers a 4-year comprehensive training programme at the frontier of scientific research in Probability, Stochastic Analysis, Stochastic Modelling, stochastic computational methods and applications in physics, finance, biology, healthcare and data science.

The Centre provides funding for DPhil studentships in the following areas:

FOUNDATIONS	APPLICATIONS
Stochastic analysis: foundations and new directions	Randomness and universal behaviour in physical systems
Stochastic partial differential equations	Stochastic modelling and data-driven modelling in finance
Random combinatorial structures: trees, graphs, networks.	Mathematical modelling in biology and healthcare
Computational methods: simulation, stochastic optimisation and control	Mathematical and algorithmic challenges in Data Science
Random dynamical systems and ergodic theory	Collective Dynamics: Mean field models and Agent-based modelling

Course structure: 4-year DPhil programme focused on research

Year 1: mandatory coursework involving
- Four 8-hour introductory courses in the first 2 weeks (Sept-Oct):

Foundations of Stochastic Analysis	Foundations of Data Science
Function spaces and Distributions	Programming in Python

- Four advanced Core courses in Term 1 (Oct-Dec):

Advanced topics in Stochastic Analysis	**Advanced Topics in Data Science: Deep Learning**
Advanced topics in Stochastic Modelling: Stochastic PDEs	**Simulation methods and stochastic algorithms**

followed by 3 Elective Courses at Oxford or Imperial College London and a supervised research project in Terms 2 and 3.

YEARS 2, 3 and 4: Supervised research culminating in a PhD thesis. The CDT gives access to a pool of 40 supervisors from the Oxford Mathematical Institute, the Oxford Dept of Statistics and the Dept of Mathematics, Imperial College.

Throughout the 4-year period students also participate in various **cohort activities:**

- Monthly CDT seminars/workshops in Oxford and London
- Annual CDT Spring Retreat with tutorials and industry speakers
- Annual **Summer School in Mathematics of Random Systems**
- 'Problem-solving' group projects

INDUSTRY PARTNERSHIPS

The CDT has multiple industry partners in the areas of Data Analytics, finance and healthcare. Industry partners provide funding for DPhil projects linked to their areas of activity. Candidates with an interest in industry-related research projects are encouraged to apply.

ADMISSIONS AND FUNDING

The **CDT in Mathematics of Random Systems** welcomes applications from talented students with a strong mathematics background, especially in probability and analysis, for the academic year beginning in September 2019.

Applicants are expected to have a first class/ honours degree in mathematics or a related discipline, and have research interests related to the scientific areas covered by the CDT. Successful applicants will receive funding for the duration of their 4-year studentship.

Applicants meeting the selection criteria will be invited for an interview, either in person or via Skype. Information can be found at: https://www.ox.ac.uk/admissions/graduate/courses/mathematics-random-systems?wssl=1

For more information on the CDT or the application process please contact us: RandomSystems@maths.ox.ac.uk