

# The MASDOC Opportunity

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Mathematics Institute

LMS Prospects, 18 December 2012

Application deadline: 15 Feb 2013. Offers are made throughout the  
year



THE UNIVERSITY OF  
WARWICK

## What is MASDOC

**M**athematics **a**nd **S**tatistics  
Centre for **D**octoral Training



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### Mathematics and Statistics Centre for Doctoral Training

- ▶ 1+3 = 4-year Ph.D. programme
- ▶ Warwick Mathematics and Statistics
- ▶ around 9 studentships for 4 years funded, enhanced EPSRC stipend, plus others from different funding sources



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Analysis  
Probability  
Numerics  
Statistics



## What is offered?

# Analysis Numerics



# Probability Statistics

stochastic PDEs  
inverse problems  
PDEs & numerics  
multiscale methods  
statistical mechanics  
complexity & dynamical systems  
sampling in high-dimensional spaces

weather forecasting  
materials science  
biomembranes  
brain imaging  
epidemiology  
finance  
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### Bonus:

- ▶ integrated in a cohesive group
- ▶ high-level support over 4 years

# Structure of MASDOC

**Year 1: M.Sc.**

**Year 2–4: Ph.D.**



# Structure of MASDOC

## Year 1: M.Sc.

- ▶ Taught Modules (oct – mar/apr)
- ▶ Research Study Group (dec – may)
- ▶ Dissertation (mar – sep)

**1/2 Taught + 1/2 Research**

## Year 2–4: Ph.D.





# Taught Modules

- ▶ offer 9 core modules; students take **six**, at least 4 core (**flexibility**)
- ▶ Assessed by written assignments, oral exams (**no written exams**)

## Available Modules:

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- ▶ **Reading Module:** varying topics
- ▶ M Level Maths & Stats modules



# Research Study Group

- ▶ Supervised **group project** on a “hot topic”
- ▶ Formulate and then execute a research project
- ▶ Get to know peers, develop research and presentation skills
- ▶ Hot Topics in 11/12:
  - ▶ Media in Motion
  - ▶ Mathematics of Multiscale Materials
  - ▶ Stochastic Finance
- ▶ Hot Topics in 10/11:
  - ▶ Stochastic PDEs
  - ▶ Population Genetics
  - ▶ Mathematics of Cloud formation

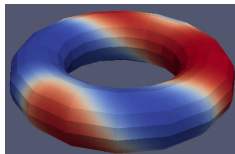
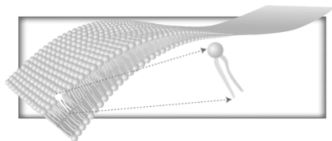
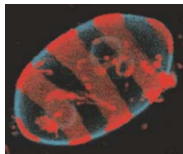


# Examples of Student Projects: A & N & P

Surface PDEs:

(Lam, Elliott, Stinner)

$$\frac{\partial u}{\partial t} - \Delta_{\Gamma} u + \frac{\Psi'(u)}{\epsilon^2} = 0 \quad \text{on manifold } \Gamma$$

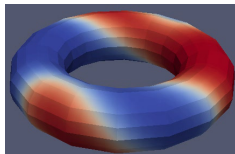
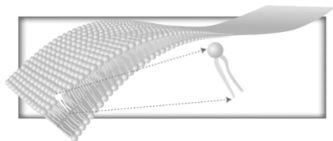
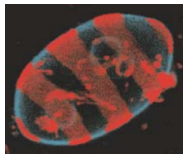


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SPDEs on Manifolds:

(Scott, Hairer, Elliott)

$$du = \mathcal{A}(t, u)dt + i_t dW, \quad u(t) \in L^2(\Gamma(t); \mathbb{R})$$

# Student Project on Probability

**Percolation:**

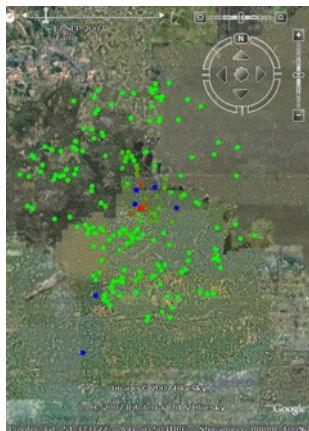
(Eyers, Adams)

Schramm/Smirnov/. . . theory of percolation



# Example of Future Research Area

## SINR Model for Infectious Disease Epidemiology:



- ▶ eg Foot and Mouth disease
- ▶  $\approx 10^5$  sheep and cattle farms in the UK
- ▶ Predict spreading of disease
- ▶ Observations: e.g., Farm  $i$  is infected at time  $t$
- ▶ Markov Process Model:

$$\mathbb{P}(i \text{ infects } j \text{ in } [t, t + \Delta t]) = \beta_{i,j} \Delta t$$

- ▶ Bayesian statistics:
  - ▶ Uncertainty of parameters  $\beta_{i,j}$
  - ▶ Sampling in  $10^5$ -dim. space

↪ Research Study Group in 2012/2013!

# Why Warwick?

- ▶ **large active research community**
- ▶ inclusive, collaborative, creative atmosphere
- ▶ modern campus environment
  
- ▶ Warwick Symposium (since 1965):  
11/12: Probability; 12/13: Number theory;  
**13/14: Statistical mechanics**
- ▶ MIR@W: Mathematical Interdisciplinary Research at Warwick
- ▶ CRISM: Centre for research in statistical methodology
- ▶ Centre for Complexity Science
- ▶ Discrete Mathematics and Applications (DIMAP)
- ▶ Molecular Assembly (MOAC)
- ▶ Centre for Scientific Computing (CSC)
- ▶ . . . . .

CRISM



MIR@W

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# Applications

- ▶ We seek outstanding applicants open to interdisciplinary or specialised research in A/P/N/S
- ▶ we make offers throughout the year
- ▶

`www.warwick.ac.uk/go/masdoc`

or Google: “masdoc”

or just get in touch to discuss

