

# Mike Irvine

Doctoral Candidate



## contact

Centre for Complexity  
Science  
Zeeman Building  
University of Warwick  
Coventry  
CV4 7AL

+44 24 761 50944  
+44 7554431412

m.a.irvine  
@warwick.ac.uk

Website

## languages

English mother tongue  
Japanese & Mandarin  
basic competency

## personal statement

I am a PhD candidate in mathematics and complexity science with a strong motivation for the application of Mathematical, statistical and simulation techniques to real world problems. I have experience of mathematical modelling and statistics for application in ecology, evolution and epidemiology. My current research focuses on techniques for inference in vegetative spatial processes. This includes comparing known measures of spatial pattern to underlying dynamics as well as Bayesian inference on spatial data. Other current interests include transient dynamics in host-parasitoid systems and how the evolution of perceived competition affects disease spread in heterogeneous environments.

I am an active member of my department and have taken on a number of organisational and teaching responsibilities alongside my PhD work, this has included being a member of the Staff Student Liaison Committee, being a co-organiser for a three-day conference attended by over a hundred delegates from several institutes and organising and running a support class for final year Mathematics undergraduate students.

I have excellent communication and group skills, these have partly been developed in my volunteer work for a helpline where I took on a number of roles including being a shift manager being responsible for the safe and effective running of the service and having to make difficult on-the-spot decisions. I enjoy the opportunity to travel and make new contacts, this has included visiting Singapore for a conference and to establish links between the Centre for Complexity at Warwick and at Nanyang Technological University. I am a member of the Warwick Infectious Disease and Epidemiology Research group where I have enjoyed the opportunity to collaborate with academics from a wide range of disciplines.

Finally I am interested in public engagement in science. As such I have been a project leader for a bee conservation group. Responsibilities included organising practical conservation sessions for maintaining a local bee habitat as well as organising practical sessions for volunteers to create bee nests for the general public.

## education

2011-2014    PhD Complexity and Mathematics    University of Warwick, UK  
Supervisors: MJ Keeling University of Warwick, JC Bull Swansea University  
*Pattern Formation and Resilience in Vegetative Ecosystems*  
Explored the link between spatial pattern and dynamics in vegetative ecosystems.  
Main developments:

- Developed a novel model of stochastic vegetative growth with local and long-range spatial interaction that reproduces known properties of vegetative patterns and dynamics.
- Combining spatial and temporal datasets to establish a link between spatial pattern and dynamical persistence.
- Developed novel methodology using conservation of spatial pattern to perform inference on a single spatial snapshot to fit a kernel-based model of vegetation.
- Constructed an aggregation-fragmentation model and investigated properties of vegetation patch-size distributions
- Explored how disease can affect the evolution of pattern formation in vegetation with spatial competition as a heritable trait

## education cont.

- 2010–2011 MSc Complexity Science (*Distinction*) University of Warwick, UK  
Two-part thesis on themes in Ecology and adaptive systems  
*Predator Memory in Adaptive Food Webs*  
An individual-based model to explore how predator memory can stabilise a food-web that would otherwise be driven to extinction under standard Lotka-Volterra dynamics.  
*The Role of Hubs in the Emergence of Tags on Scale-Free Networks*  
Explored tag-based cooperation on a network. In particular, optimal strategies to exploit the underlying topology in order to maximise the persistence of a tag with application to technological markets.
- 2006-2010 MSci Mathematics with Languages (*1st Hons*) University College London, UK  
Dissertation on *Quadratic Invariants of Lotka-Volterra Systems*
- 2005-2006 A-levels Castell Alun High School, UK  
Biology A  
Chemistry A  
Mathematics A  
Physics A

## awards

- 2014 NTU-Warwick Winter School in Complexity NTU, Singapore  
Awarded travel grant to enable attendance to winter school and conference.
- 2010 Full EPSRC Scholarship University of Warwick, UK  
Awarded scholarship for combined MSc & PhD program in Complexity Science.
- 2010 Santander "1-UCL" Excellence/Endeavour Award University College London, UK  
Awarded for outstanding achievement and endeavour in a non-academic field.

## teaching

- 2011-2013 Topics in Mathematical Biology Support Class University of Warwick  
Organised and lectured problem class to supplement lectures for Maths 3rd year undergraduate course.
- 2011-2014 Undergraduate Supervisor in Mathematics University of Warwick  
Facilitated small group work. Marked assessed work.



## skills & experience

### Technical

Mathematical modelling; dynamical system analysis; agent-based modelling. Time-series analysis; image analysis including pattern detection and spectral methods; Bayesian statistics including MCMC methods.

Scientific computing; Matlab; Mathematica; C++; using both local and high-performance clusters.

- 2012- Three Rings CIC  
Web development  
Volunteer web developer for online rota web application used by several helplines and charities internationally ([threerings.org.uk](http://threerings.org.uk)). Collaborated with other web developers to deliver services tailored towards user specifications. Have gained experience in ruby, rails, php, javascript, html, css and python.
- 2013 SCCS13  
Organisational  
Co-organised the Student Conference on Complexity Science 2013 in Oxford, UK. Organised and budgeted accommodation and location for conference as well as working as part of a team to deliver a three-day conference with over a hundred delegates from a number of institutes.
- 2008-2014 Nightline  
Communication  
Have had extensive training in active listening as well as experience in running training sessions, group discussions and people management in role as a volunteer for the helpline Nightline. I have taken on a number of leadership roles in the organisation including developing policy and membership of several committees. These have included shift manager where I was responsible for the safe and effective running of the service as well as for the welfare of the volunteers. I have lead group training to volunteers as well as student welfare employees outside of the Nightline organisation. I have facilitated discussions and role-plays and communicated with other trainers in order to provide analysis and feed-back.
- 2013-2014 Tocil Bee Meadow, Warwick  
Conservation  
Project leader for volunteer project maintaining the Tocil Wood bee habitat meadow and raising awareness of bee habitat loss to general public. Responsibilities included organising and running practical volunteer sessions and organising the maintenance of a bee habitat.

## references

Matt J. Keeling  
PhD Supervisor  
E-mail: [m.j.keeling@warwick.ac.uk](mailto:m.j.keeling@warwick.ac.uk)  
Phone: +44 (0)24 7652 4618 (LifeSci)  
Phone: +44 (0)24 7657 4832 (Maths)

James C. Bull  
PhD Supervisor  
E-mail: [j.c.bull@swansea.ac.uk](mailto:j.c.bull@swansea.ac.uk)  
Phone: +44 (0)17 9260 2972