Curriculum Vitae

Beth M. Stokes

Postgraduate Student at the University of Bath - bms58@bath.ac.uk

Education

Integrated PhD in Statistical Applied Mathematics - University of Bath (2021 - present)

MRes qualification obtained during 1st year of study (2021 - 2022). Academic transcript can be provided on request.

MSci Mathematics - University of Birmingham (2017 - 2021)

1st Class. Academic transcript can be provided on request.

A-Levels and AS Levels

A-level Mathematics (A*), Further Mathematics (A*) and Chemistry (A), AS-level Physics (B).

GCSE's

12 GCSE's (A* - B) including English and Mathematics.

Research Experience

PhD Project: Collective Motion Under Non-Reciprocal Pairwise Interactions (2022 - present)

Preliminary experimental work and mathematical modelling suggest that sexual conflict can give rise to non-reciprocal interactions and anomalously fast diffusion of pairs of Trinidadian Guppies (Poecilia reticulata). In the long-term, their behaviour also results in key ecological and evolutionary processes such as population dispersal and invasion of alien species. Using mathematical techniques from agent-based modelling, mean-field and coarse-grained approximations and continuous time PDE modelling, the aim of the project is to develop a general framework, or suite of mathematical models, to interpolate between and extrapolate from one social, spatial and temporal scale to the next, modelling the effect on non-reciprocal social forces in Trinidadian Guppies on large-scale population structure and the ecological and evolutionary consequences of their behaviour.

Integrative Think Tanks - University of Bath (2022)

During my first year of study for my PhD I attended two week-long workshops held in collaboration with industry partners, who bring forward problems for the attendees to work on throughout the week. The workshops give insight into a fast paced, industrially focused research environment and provide training for PhD students in the form of collaborating and formulating and solving problems as a group over a short time frame. Both projects I worked on were environmentally focused, giving me an insight into how industrial companies require mathematical modelling and techniques to help them look towards a greener future for our planet.

Project in Mathematical Sciences (2020 - 2021)

For my Master's project, I devised a new, agent-based model of collective motion, specifically designed to recreate the murmuration phenomena commonly observed in large flocks of starlings. The model was simulated numerically for a wide range of parameter values and the rich behaviours resulting from these simulations were investigated in detail. The project's findings are now being used to support the development of a new radar system, enhancing its capabilities for recognising and tracking bird flocks.

Undergraduate Research Intern (2020)
During the summer of 2020, I worked alongside a Research Fellow on a British Academy funded project, exploring a new paradigm of agent-based opinion dynamics. Much of my time was spent creating the model and developing the MATLAB code for the numerical investigation, reviewing the vast amount of literature in the field of opinion dynamics to date, and writing drafts for the publication (see below).

Research Skills in Mathematics (2019 - 2020)
This module was completed as part of the 3rd year of my degree, producing a short research paper and accompanying presentation on a topic of my choice. The module helped me to develop a deeper understanding of the process behind conducting and communicating research.

EPSRC Summer Project (2019)
I was awarded an EPSRC vacation bursary to complete an undergraduate research project under the supervision and guidance of a Post-Doctoral Research Fellow at the University of Birmingham. As my first experience of research, I found this extremely enjoyable and it resulted in the start of my desire to pursue a career in research.

Mathematics in Industry (2019)
This module was completed as part of the 2nd year of my undergraduate degree. During which, I undertook a group research project, set by Mott MacDonald, over a period of 10 weeks. We produced both a report and a poster to demonstrate the outcomes of our project, to a varied audience.

Publications

Stokes, B.M., Jackson, S.E., Garnett, P. and Luo, J., 2022. Extremism, segregation and oscillatory states emerge through collective opinion dynamics in a novel agent-based model. The Journal of Mathematical Sociology, pp.1-39.

Conferences and Workshops

Ada Lovelace Day - Bath (October 2022)
Organiser. A whole day of activities, seminars and a poster session in honour of Ada Lovelace, to celebrate the contributions of women in mathematics and STEM.

INI Mathematics of Movement Workshop - Cambridge (July 2023)
Attendee and Poster on "The Role of Density Dependent Diffusion in Reaction-Diffusion Systems".

Soapbox Science - Exeter (June 2023)
Attendee and invited speaker. Soapbox Science is a public outreach event in which academics communicate their research to passers by with some props and the power of their voice. My talk was titled “Why birds only need to count to 7!”.

British Applied Mathematics Colloquium - UWE (April 2023)
Attendee and speaker. Talk given on the corresponding publication (see above) "Extremism, segregation and oscillatory states emerge in a novel agent-based model".

Ada Lovelace Day - Bath (October 2022)
Organiser. A half day of seminars and a poster session in honour of Ada Lovelace, to celebrate the contributions of women in mathematics and STEM.

ECMTB - Heidelberg (September 2022)
Attendee only.

From Individual to Collective Behaviour in Biological and Robotic Systems - ICMS Edinburgh (July 2022)
Attendee and speaker. Talk given on the corresponging publication (see above) "Extremism, segregation and oscillatory states emerge in a novel agent-based model".

Other Work Experience

School of Mathematics Ambassador - University of Birmingham (2017 - 2021)
Alongside my studies, I also worked as an ambassador for my department. This involved attending University Open Days and Offer Holder Days, talking to a wide range of applicants ans visitors, showing them around the University campus, and generally trying to pass on my love of mathematics.

Shop Assistant - Karakter Kakes (2012 - 2019)
I worked in a small local business at weekends and in School/University holidays, serving customers and making stock checks, to place orders with the suppliers.

Kennel Hand - Old Barn Kennels (2018 - 2019)
My work here involved providing short-term boarding care for dogs while their owners were on holiday. This was most enjoyable, and the fact that it was early mornings and done on a part voluntary basis demonstrates another aspect of my hard-working character.

Spring Insight Week - Schroders (2018)
I spent a week with Schroders at their London offices and gained in-depth knowledge of what asset management is all about. As well as learning about the company and how it works, I spent time shadowing the Value Investment Team, which afforded me an interesting first-hand insight into some of the work the company does.

Awards and Achievements

James Mann Prize for Best Applied Master's Project, University of Birmingham, 2021.
George Watson Scholar Award, University of Birmingham, 2017.
Silver and Bronze Awards, Leeds University Senior Maths Challenge, 2015 and 2016, respectively.
Grammaticus Scholarship awarded by Cardinal Griffin Catholic College, 2014-2015.
Best Attainment in Year Group Award at Cardinal Griffin Catholic College, 2011, 2013, and 2014.
Gold Award and Best in School Award in the Leeds University Junior Maths Challenge, 2012.