

John Fitzgerald

CONTACT INFORMATION

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EDUCATION

InFoMM (EPSRC CDT), University of Oxford (2018–2022)

Third year

Attended NeurIPS conference (virtual); helped organise the Oxford Summer School in Economic Networks; acted as facilitator in an ATI Data Study Group (DSG) for Entale; presented lightning talk at Networks 2021.

Continuing PhD project, with specific focus on applying statistical models for dynamic networks to publication data to better understand the development of knowledge.

Second year

Accepted poster for CompleNet conference; participated in an ATI DSG and Policy Hacks Oxford; attended GeoInno2020 conference

Began PhD project investigating the process of knowledge accumulation through temporal network analysis of publication data, in collaboration with Elsevier, and supervised by Prof. Neave O’Clery (UCL) and Prof. Peter Grindrod (Oxford). Aiming to contribute to social science literature surrounding the knowledge economy, as well as towards general network theory and data analytics techniques.

First year

Mathematical modelling; Scientific computing; Modelling, analysis and computation of discrete and continuous real-world problems; Maths for energy; Contemporary numerical techniques; Mathematical analytics

Awarded IMA prize for Best Team Performance in the UK Graduate Modelling Camp, for vasculature reconstruction from RGB facial images – supervised by Prof. Huaxiong Huang. Investigated neural network defences for DSTL at ESGI 145, with promising leads for adversarial example detection.

MMath Mathematics, University of Oxford (2014–2018)

Fourth year (MMath) – 1st Class Honours (80.6%)

Topics in fluid mechanics; Mathematical mechanical biology; Elasticity and plasticity; Networks; Perturbation methods; Statistical mechanics; Applied complex variables; CCD Dissertation

Awarded Lincoln College scholarship on the recommendation of tutors for academic achievement and exceptional promise.

Third year (BA) – 1st Class Honours (79%)

Viscous flow; Waves and compressible flow; Numerical solution of differential equations I; Applied PDEs; Classical mechanics; Nonlinear systems; BEE Extended essay

Awarded a grant from the Senior Tutor’s Fund (Lincoln College) to conduct extra-curricular research in the summer before the start of the year.

Second year – 2:1 (67.3%)

Various options (available on request)

First year – Pass (70%)

Various core options (available on request)

Sir John Lawes School, Harpenden, Herts (2007–2014)

A-Levels: Maths (A*), Further maths (A*), Chemistry (A*), Physics (A*)

AS-Levels: Biology (A), Music (B)

GCSEs: 8 A*, 2 A, 1 B & FSMQ (A) (*available on request*)

Is academia becoming more localised? The growth of regional knowledge networks within international research collaboration (2021)*In collaboration with Dr Neave O'Clery and Sanna Ojanperä, accepted to Applied Network Science*

It is well-established that the process of learning and capability building is core to economic development and structural transformation. Since knowledge is 'sticky', a key component of this process is learning-by-doing, which can be achieved via a variety of mechanisms including international research collaboration. Uncovering significant inter-country research ties using Scopus co-authorship data, we show that within-region collaboration has increased over the past five decades relative to international collaboration. Further supporting this insight, we find that while communities present in the global collaboration network before 2000 were often based on historical geopolitical or colonial lines, in more recent years they increasingly align with a simple partition of countries by regions. These findings are unexpected in light of a presumed continual increase in globalisation, and have significant implications for the design of programmes aimed at promoting international research collaboration and knowledge diffusion.

Three-dimensional exponential asymptotics and Stokes surfaces for flows past a submerged point source (2020)*In collaboration with Dr Philippe Trinh and Yyanis Johnson-Llambias*

We extended my dissertation work to allow for determination of wave occurrence locations within the fluid, through furthering my previous numerical scheme to use those free-surface solutions as new initial conditions for different ray equations.

OTHER RESEARCH
EXPERIENCE**InFoMM mini-project (April 2019 – July 2019)***Compression and Bayesian inference for deep neural networks**Supervised by Prof. Stephane Chretien and Prof. Jared Tanner*

In collaboration with the National Physical Laboratory, I investigated the applicability of deep neural networks for the task of semantic segmentation of satellite images of the sea. The project then evolved into an exploration of a variety of network compression techniques, and also (of particular interest to NPL) methods for uncertainty quantification. The combination of these techniques may additionally provide a means of detecting adversarial examples, thus assisting NPL in their pursuit of high-accuracy, robust neural networks for use in a variety of real-world tasks.

Fourth year Dissertation (October 2017 – March 2018)*Exponential asymptotics and Stokes surfaces in nonlinear three-dimensional flows**Supervised by Dr Philippe Trinh*

Previous research demonstrated it might be possible to develop techniques for studying three-dimensional free-surface flows using exponential asymptotics. This was the key part of my fourth year project. In particular, I developed numerical methods for ascertaining the locations of Stokes surfaces (related to the occurrence of waves) that arise in flows past nonlinear geometries. In addition to developing techniques in asymptotic analysis, this project involved numerical solutions of nonlinear PDEs.

TEACHING &
MENTORING
EXPERIENCE**University teaching (2019-)**

I have been both a teaching assistant (TA) and lead tutor for intercollegiate classes for undergraduates in the university. Being a TA entails marking sheets and leading parts of classes, while as a tutor I oversee TA performance and lead the bulk of the class. This year, I have been a tutor for the third year Graph Theory, and fourth year Networks modules, while previously I was a TA for the third year Logic, and fourth year Theories of Deep Learning modules. Clarity in conveying different ways of understanding the same question and being engaging while teaching are key in ensuring students gain the most benefit from our time together.

Volunteer Academic Support Tutor for IntoUniversity (2017-2018)

During my third year, I worked with secondary school students from disadvantaged backgrounds in afterschool sessions, with the aim of increasing progression rates into higher education. I had to be able to teach maths concisely and clearly to those who typically struggle in this area. In my fourth year I then began doing one-on-one mentoring work with IntoUniversity as well as through another university scheme, Empower.

Activities Coordinator for Oxbridge International Summer School (2017)

I was a crucial member of the team for the summer school – a social enterprise which donates all profits to a variety of charities, principally related to education. I designed and ran activities for around 20 students (aged 15-19) over three two-week sessions, including giving debating workshops and admissions advice, as well as providing subject related assistance for mathematical students. I also organised travel to other locations outside of Oxford, created new forms and certificates for the company, and co-ran their social media (Facebook and Instagram).

OUTREACH &
OTHER
EXPERIENCE

Local Group Support Team for Labour for a Green New Deal (2019–)

I have become increasingly involved in the campaign for a Green New Deal, a rapid mobilisation of the state to decarbonise the economy before consigning millions in the Global South to a dystopian climate apocalyptic future. I am currently the South East regional coordinator for local groups during the general election campaign, organising training events, social media, and knowledge and resource sharing.

Lincoln College representative for Oxford Hub (2017–2018)

I was involved in raising awareness for a variety of charitable sector/volunteering opportunities in the local community for Oxford Hub, the main student volunteering organisation. In doing so I have improved practical social media skills.

Committee member and volunteer for Free to Be (2017–)

During my fourth year, I helped organise social events and fundraising through the student body for Free to Be, an organisation which runs therapeutic residential projects for disadvantaged young children, giving them the opportunity to have the experience of being children with a responsible and caring adult role model. I also volunteer as a Group Leader on some of their sessions, with full-time responsibility for five 8-10 year olds, enabling me to develop leadership, mentoring and people skills.

Counsellor for Oxford Royale (2016)

On another summer school, I had responsibility for a multi-national group of around 80 young people (aged 12-16) on a daily basis for a month, ensuring punctuality, creating extra-curricular activities, leading off-site visits and providing counsel. This required enthusiasm, commitment, leadership and organisational skills, problem solving and the ability to work with colleagues and clients of many nationalities.

The Student Consultancy (2016)

In my second year I worked for The Student Consultancy, a university group designed to help local businesses, charities and community organisations. I was assigned to the Oxfordshire Community Foundation, and developed both the ability to analyse large quantities of data and team skills.

GENERAL

Knowledge of Python, MATLAB, L^AT_EX and Mathematica, with frequent use.

Lifelong interest and commitment to music, expert on several instruments and continue to play.

Intermediate ability Spanish.