Nowell Hollier Phelps
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Education

PhD in Biostatistics Johns Hopkins University 2024 – 2029 (expected)

MMath in Mathematics University of Oxford 2017 – 2021
Master's component | Part C | *Distinction* (74 weighted average)

- Dissertation "A coevolutionary voter model for opinion dynamics on hypergraphs" graded 81. Supervised by Renaud Lambiotte.
  - Investigated the mechanisms of political polarization and consensus in the context of higher-order social interactions by extending the coevolutionary network voter model to 3-uniform hypergraphs.
  - Derived stochastic master equations to describe the system under a mean-field assumption and observed outcome sensitivity to parameter values through Monte Carlo simulations in Python.
- Projects "Stochastic block models and their use in network node classification" and "Predictive computational models for epidemiology".
- Classes: Networks, Probability and Statistics for Network Analysis, Mathematical Physiology, Computational Biology, Combinatorics, Probabilistic Combinatorics.

Undergraduate component | Part A and Part B | *Second Class, Division One* (69 weighted average)

- Structured project dissertation "The Thermohaline Circulation: Box Models and Stability" graded 72. Investigated the behaviour of the thermohaline circulation under temperature increase through extensions to Stommel's block model, deriving and investigating systems of coupled ODEs.
- Classes included: Probability, Statistics and Data Analysis, Multivariable Calculus, Linear Algebra, Differential Equations, Real Analysis, Metric Spaces and Complex Analysis, Topology, Group Theory, Rings and Modules, Set Theory, Graph Theory, Mathematical Biology, Mathematical Models for Financial Derivatives.

Activities: Turl Street Arts Festival treasurer, and orchestra member; Mathematics Subject Representative for Jesus College; JCR IT Officer for Jesus College; Jesus College rowing and football; Oxford University Cross Country Club.

Experience

Visiting Researcher *African Institute for Mathematical Sciences Research and Innovation Centre* March – July 2024
Research visit at AIMS RIC in Kigali, Rwanda.

- Worked with AIMS RIC's climate team to construct a database including meteorological, demographic, physical and health data to enable research on climate-health topics in urban contexts in Rwanda and Ghana.
- Conducted initial exploration into modelling continuous air-temperature at granular spatial and temporal scales.

Research Assistant in Epidemiology and Population Health *Imperial College London* March 2022 – July 2024
RA in the NCD Risk Factor Collaboration, WHO Collaborating Centre on NCD Surveillance, Epidemiology and Modelling, supervised by Majid Ezzati.

- Modelled trends in risk factors for non-communicable diseases using a complex Bayesian hierarchical model in R.
- Adapted, tested, and applied the model to lead analysis updating the World Health Organization's global and national underweight and obesity estimates.
- Developed methodology to improve the computational efficiency of the model's MCMC sampler.
- Developed figures and animations for results dissemination using ggplot and plotly.
- Led systematic checks of the anthropometry database, containing measurements of over 220 million individuals.
- Carefully checked, extracted, and harmonized new data sources, working closely with global collaborators and a small interdisciplinary core team.

Summer Studentship *Big Data Institute, University of Oxford* July – September 2021
Eight-week research internship on schistosomiasis, supervised by Goylette Chami.

- Used satellite imagery, QGIS and R to construct shapefiles of water contact sites on Lake Victoria and linked to household GPS data to calculate household distance to water contact under various heuristics.

- Investigated the distribution of mass-drug treatment for schistosomiasis by constructing and analyzing spatial threshold networks. Found evidence for spatial clustering in some villages but no association between drug distributor household membership and treatment rate of communities.

Undergraduate Research Project *Mathematical Institute, University of Oxford* August – September 2020
Four-week research project in Neave O'Clery's group on urban dynamics.

- Looked at methods to distinguish between dyadic and community-level influence on household-level adoption of a microfinance scheme in rural India, performing statistical tests in MATLAB.

Peer-reviewed publications

2024

1. NCD Risk Factor Collaboration (NCD-RisC). "General and abdominal adiposity and hypertension in eight world regions: a pooled analysis of 837 population-based studies with 7·5 million participants". *The Lancet* (2024). https://doi.org/10.1016/S0140-6736(24)01405-3

2. **[Joint lead author]** NCD Risk Factor Collaboration (NCD-RisC) "Worldwide trends in the burden of underweight and obesity from 1990 to 2022: a pooled analysis of 3663 population-representative studies with 222 million school-aged children, adolescents and adults". *The Lancet* (2024). https://doi.org/10.1016/S0140-6736(23)02750-2

2023

3. NCD Risk Factor Collaboration (NCD-RisC). "Global variation in diabetes diagnosis and prevalence based on fasting glucose and hemoglobin A1c". *Nature Medicine* (2023). https://doi.org/10.1038/s41591-023-02610-2

4. NCD Risk Factor Collaboration (NCD-RisC). "Diminishing benefits of urban living for children and adolescents' growth and development". *Nature* **615**, 874–883 (2023). https://doi.org/10.1038/s41586-023-05772-8

Invited Seminar

"MCMC for a large Bayesian hierarchical model" Statistics seminar group, University of Kent. October 2023

Outreach and Volunteering

Site Manager *Opportunity Oxford, University of Oxford* September 2020 & September 2021
Managed two ambassadors to ensure the wellbeing of students during a two-week residential program for incoming first year students from underrepresented backgrounds. Returned in role.

Ambassador *UNIQ, University of Oxford* July – August 2020
Student ambassador on summer school for state-educated year 12 (11^{th} grade) prospective Mathematics and Computer Science applicants, providing academic and admissions support and encouragement.

Team Guide *International Mathematics Olympiad* July 2019
Volunteered as a guide for the Nepalese national team, helping aid communication, logistics, and running activities and tours.

Junior Members' Scholarship Representative *Jesus College Oxford* January – December 2018
Responsible for Jesus College Oxford's JCR scholarship, which supports an undergraduate student from an area of the world where access to higher education is limited. Provided practical support to the scholar, managed budget, and advocated for the scholarship to students and staff.

Ambassador *Jesus College Oxford* October 2017 – July 2021
Tours of college on open days and running activities/assisting prospective students during interview period.

Employment (other)

Mentor *Space School UK* August 2019
Mentor on residential astrophysics summer school for 13–18-year-olds at the University of Leicester.

Painter *Angel Custom Painting* July – September 2018
Employed full-time as housepainter and assistant in Bozeman, Montana for ten weeks.

Prizes/awards

College Prize *Jesus College Oxford* August 2021
For distinction in Final Honour School of Mathematics (Part C).

Summer Studentship *Big Data Institute, University of Oxford* July 2021
Awarded £3000 to fund summer studentship.

Open Exhibition *Jesus College Oxford* August 2020
Awarded for first-class performance in third-year undergraduate studies.

College Prize *Jesus College Oxford* January 2018
Academic prize for excellent performance in collections (internal college exams).

Skills

Highly proficient in: R (Tidyverse, Plotly, Shiny), LaTeX, HPC systems, Microsoft Office, Adobe
Experience with: Python (NumPy, NetworkX), Jupyter Notebooks, QGIS, MATLAB, git
Languages: native English, basic German (CEFR A2)

References

Professor Majid Ezzati, Chair in Global Environmental Health, School of Public Health, Imperial College London
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Dr Goylette Chami, Associate Professor, Robertson Fellow, Big Data Institute, University of Oxford
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Professor Renaud Lambiotte, Professor of Networks and Nonlinear Systems, Mathematical Institute, University of Oxford
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