James McAllister – CV

PhD Researcher – Mathematical Neuroscience
Website: https://jajmcallister.github.io/
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GitHub Profile
LinkedIn Profile

Education

- **PhD, Mathematics and Computational Neuroscience, Magee College** *2023 – present*
  Intelligent Systems Research Centre, University of Ulster
  "Mathematical & computational spectral graph theory-based analysis & modelling of heterosynaptic plasticity"
- **MRes (Masters of Research), Queen's University, Belfast** *2022–2023*
  Distinction
- **PGCE (Mathematics), Queen's University, Belfast** *2018–2019*
  GTCNI Star Award and E. Fulton Prize for Mathematics
- **MA (Dubl) Mathematics, Trinity College Dublin** *2014–2018*
  First Class Honours with Gold Medal

Experience

- **Visiting Researcher: University of Bristol** *February 2024 – present*
  Mathematics, Computing, and Neuroscience, Intelligent Systems Research Lab
- **Postgraduate Teaching Assistant: University of Ulster** *2023 – present*
  Mathematics and algorithms modules
- **Teacher of Mathematics: Wellington College Belfast** *2019–2022*
  Mathematics, Further Mathematics, and Physics

Research Projects, Publications, and Presentations

- **Graph-theory perspectives on recurrent neural network structure in reservoir computing** *2024*
  Ongoing research collaboration with University of Bristol
- **Heterosynaptic plasticity rules induce small-world network topologies** *Due June 2024*
  Poster: International Conference of Mathematical Neuroscience, Dublin
- **The capacity and accuracy of a triple well Hopfield model** *2023*
  Research Project: Intelligent Systems Research Centre
- **A discrete attractor model of decision making** *2023*
  Research Project: Using dynamical systems to model decision-making processes
- **The topology of autistic heterogeneity** *2022/23*
  Research Project: Using topological data analysis to examine autism neuropsychological data
- **The impact of formative assessment on student attitudes to mathematics** *2023*
  A synthesis of the literature
- **Insights from a multilevel analysis of high-stakes examination results in mathematics** *2021*
  Cantley, I., & McAllister, J. https://doi.org/10.1007/s11199-021-01234-5
- **Trigonometric Series and the Emergence of Transfinite Set Theory** *2018*
  Final Year Research Dissertation & Poster. First class (distinction). Trinity College Dublin
- **Complex Numbers in Mathematics Education** *2018*
  Mathematics Education Research Project. First class (distinction). Trinity College Dublin

Skills and Interests

Languages: English, German, French, British Sign Language

Programming Languages: Python, Julia, MATLAB, SPSS

Other Developer Tools: LaTeX, Microsoft, Google Suite

Areas of Interest: Graph & network theory, mathematical modelling of synaptic plasticity, applications of topology & topological data analysis, functional analysis, assessment theory

Achievements

- **Gold Medal, Trinity College Dublin** *2018*
- **Naughton Foundation Scholarship** *2014–2018*
- **Exhibition Award, Trinity College Dublin** *2014*
- **Trinity College Dublin Sizarship** *2014–2018*
- **Trinity College Dublin First Class Prize** *2015, 2016, 2017*
- **E. Fulton Prize for Mathematics (PGCE), QUB** *2019*
- **GTCNI Star Award** *2019*

Courses, Training, and Talks

Computational Neuroscience Autumn School (1 week): 10/23, Intelligent Systems Research Centre, Ulster University

Computational Neuroscience Neuromatch Academy Summer School (3 weeks): 07/2023

INCF (International Neuroinformatics Coordinating Facility): Mathematical & Computational Modelling of Neuronal Plasticity - Python-based modelling course

Faculty of Education, Cambridge University. Title: The gender similarities hypothesis: Insights from a multilevel analysis of high-stakes examination results in mathematics, 03/2020, research article and presentation. British Society for Research into Learning Mathematics (BSRLM).

Referees

References available on request.