James McAllister – CV

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PhD Researcher: Mathematics, Neuroscience, & Machine Learning

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Websites: jajm.uk, pure.ulster.ac.uk

 GitHub Profile

Intelligent Systems Research Centre, Magee College

 LinkedIn Profile

EDUCATION

PhD, Mathematical & Computational Neuroscience *2023 – present*
Intelligent Systems Research Centre, Magee College, University of Ulster

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

Delivering lectures in Mathematics Modules *2024 – present*
Linear Algebra, Differential Equations, Calculus, Set Theory, Statistics

Co-Supervision of Final Year Undergraduate Projects *2024 – present*
Applied maths, neuroscience, computer science, machine learning

Postgraduate Teaching Assistant *2023 – present*
Undergraduate and postgraduate tutorials in mathematics, algorithms, and data science

Visiting Researcher: University of Bristol *2024*
Intelligent Systems Research Lab, Neural Dynamics, Applied Mathematics

Teacher of Mathematics: Wellington College Belfast *2019–2022*
Mathematics, Further Mathematics, and Physics

RESEARCH PROJECTS AND PUBLICATIONS

Topological and simplicial features in reservoir computing *2024*
Paper: UK Computational Intelligence, Belfast, https://doi.org/10.1007/978-3-031-78857-4_5

Random and biological network connectivity for reservoir computing *2024*
Poster: Neural Computation Conference, Sheffield, https://doi.org/10.5281/zenodo.13303677

Heterosynaptic plasticity rules induce small-world network topologies *2024*
Poster: Int. Conf. Mathematical Neuroscience, Dublin, https://doi.org/10.5281/zenodo.13303384

Structure & function in reservoir computing networks *2024 –*
Ongoing research collaboration with University of Bristol

Mathematical modelling of synaptic maturation & circuit formation *2024 –*
Ongoing research collaboration with University of Bristol

The capacity and accuracy of a triple-well Hopfield model *2023*
Research Project & Presentation: Intelligent Systems Research Centre

A discrete attractor model of decision making *2023*

Research Project & Presentation: Using dynamical systems to model decision-making processes

A multilevel analysis of high-stakes examination results in mathematics *2021*

Cantley, I., & McAllister, J. https://doi.org/10.1007/s11199-021-01234-5

Cambridge University: Talk at British Society for Research into Learning Mathematics (BSRLM) 2020

Trigonometric series and the emergence of transfinite set theory *2018*

Final Year Research Dissertation & Poster. First class (distinction). Trinity College Dublin

Talks, Presentations, and Seminars

Topological and simplicial features of reservoir networks *Sep 2024*

Presentation: Workshop UK Computational Intelligence, *UKCI 2024*

Network structure in reservoir computing and brain connectomes *May 2024*

Seminar: Intelligent Systems Research Centre

Algebraic topology, simplicial complexes, and Hopfield networks *May 2024*

Seminar: Intelligent Systems Research Centre

Skills and Interests

Languages: English, German, French, British Sign Language

Programming Languages: Python, Julia, MATLAB, SPSS

Other Developer Tools: High Performance Computing, LaTeX, Microsoft, Google Suite

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

Achievements and Awards

Best Student Paper Award, UK Computational Intelligence, Belfast	*Sep 2024*
Visiting Scholarship, University of Bristol	*Feb 2024*
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, QUB	*2019*

Courses and Training

Computational Neuroscience Autumn School, Intelligent Systems Research Centre, Ulster University

Computational Neuroscience Neuromatch Academy Summer School

INCF (International Neuroinformatics Coordinating Facility): Python-based modelling course

British Sign Language Level 1

Referees

References available on request.