James McAllister – CV

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PhD Researcher, Mathematics: Networks & Neuroscience
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GitHub Profile
Intelligent Systems Research Centre, Magee College
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Education

PhD, Mathematical & Computational Neuroscience *2023 – present*
Intelligent Systems Research Centre, Magee College, University of Ulster
Structure & dynamics in computational networks

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 *2024*
Intelligent Systems Research Lab, Neural Dynamics, Applied Mathematics

Postgraduate Teaching Assistant *2023 – present*
Mathematics and algorithms modules

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

Research Projects and Publications

Topological and simplicial features in reservoir computing *Sep 2024*
Paper: United Kingdom Computational Intelligence, Belfast

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

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

Graph-theory perspectives on network structure in reservoir computing *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 *October 2023*
Research Project & Presentation: Intelligent Systems Research Centre

A discrete attractor model of decision making *July 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

Complex numbers in mathematics education *2018*
Mathematics Education Research Project. First class (distinction). Trinity College Dublin

Talks, Presentations, and Seminars

Topological and simplicial features of reservoir networks *September 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: 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 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

Deep Learning Neuromatch Academy Summer School

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.