

# James McAllister – CV

PhD Researcher – Mathematical Neuroscience

Website: <https://jajmcallister.github.io/>

Intelligent Systems Research Centre, Magee College

☎ 07742576089

✉ [mcallister-j23@ulster.ac.uk](mailto:mcallister-j23@ulster.ac.uk)

🐙 GitHub Profile

🌐 LinkedIn Profile



## EDUCATION

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**PhD, Mathematical & Computational Neuroscience** 2023 – present

*Intelligent Systems Research Centre, Magee College, University of Ulster*

Analysis & modelling of structure in computational networks, circuit formation, & synaptic 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

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**Visiting Researcher: University of Bristol** February 2024 – present

*Applied Mathematics, Intelligent Systems Research Lab*

**Postgraduate Teaching Assistant** September 2023 – present

*Mathematics and algorithms modules*

**Supervision of Final Year Undergraduate Projects** September 2024 – present

*Applied maths, biomathematics, neuroscience, computer science*

**Teacher of Mathematics: Wellington College Belfast** 2019–2022

*Mathematics, Further Mathematics, and Physics*

## RESEARCH PROJECTS AND PUBLICATIONS

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**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*

<b>A multilevel analysis of high-stakes examination results in mathematics</b>	2021
<i>Cantley, I., &amp; McAllister, J. <a href="https://doi.org/10.1007/s11199-021-01234-5">https://doi.org/10.1007/s11199-021-01234-5</a></i>	
<i>Cambridge University: Talk at British Society for Research into Learning Mathematics (BSRLM)</i>	2020
<b>Trigonometric series and the emergence of transfinite set theory</b>	2018
<i>Final Year Research Dissertation &amp; Poster. First class (distinction). Trinity College Dublin</i>	
<b>Complex numbers in mathematics education</b>	2018
<i>Mathematics Education Research Project. First class (distinction). Trinity College Dublin</i>	

## TALKS, PRESENTATIONS, AND SEMINARS

<b>Topological and simplicial features of reservoir networks</b>	September 2024
<i>Presentation: Workshop UK Computational Intelligence, UKCI 2024</i>	
<b>Network structure in reservoir computing and brain connectomes</b>	May 2024
<i>Seminar: Intelligent Systems Research Centre</i>	
<b>Algebraic topology, simplicial complexes, and Hopfield networks</b>	May 2024
<i>Seminar: Intelligent Systems Research Centre</i>	

## SKILLS AND INTERESTS

<b>Languages:</b> English, German, French, British Sign Language	
<b>Programming Languages:</b> Python, Julia, MATLAB, SPSS	
<b>Other Developer Tools:</b> LaTeX, Microsoft, Google Suite	
<b>Areas of Interest:</b> Graph & network theory, mathematical modelling of synaptic plasticity, applications of topology & topological data analysis, functional analysis, assessment theory	

## ACHIEVEMENTS AND AWARDS

<b>Visiting Scholarship, University of Bristol</b>	2024 –
<b>Gold Medal, Trinity College Dublin</b>	2018
<b>Naughton Foundation Scholarship</b>	2014–2018
<b>Exhibition Award, Trinity College Dublin</b>	2014
<b>Trinity College Dublin Sizarship</b>	2014–2018
<b>Trinity College Dublin First Class Prize</b>	2015, 2016, 2017
<b>E. Fulton Prize for Mathematics, QUB</b>	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.