

Curriculum Vitae

J.P. McCarthy
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Education

University College Cork

- PhD, Mathematics, 2017, with Dr Stephen Wills (UCC). The research was in Quantum Groups and the thesis title was “*Random Walks on Finite Quantum Groups — Diaconis-Shahshahani Theory for Quantum Groups*” [<https://arxiv.org/abs/1709.09357>].
- MSc by Research, Mathematics, 2010, with Dr Stephen Wills (UCC). The research was in Random Walks on Finite Groups and the thesis title was “*The Cut-Off Phenomenon in Random Walks on Finite Groups*” [<https://arxiv.org/abs/1504.05387>].
- BSc, Joint Honours Maths & Physics, 2008, 2:1 awarded broken into Maths (1:1) & Physics (2:2).

Cork Institute of Technology

- Special Purpose Award (L9), *Effective Teaching in Higher Education*, 2018.

Relevant Experience

- **Teaching & Tutoring** September 2009 - Present
 - lecturer in Cork Institute of Technology (CIT), (2017-present)
 - assistant lecturer in Cork Institute of Technology (2011 - 2017).
 - assistant lecturer in UCC (2010 - 2014).
 - tutor in UCC (2009 - 2010)

Outlines of modules taught/tutored at the above may be found in an appendix.
- **Event Management** 2010 - 2013

Annascaul, Co. Kerry

 - figure-headed the charity festival for three years and helped grow the donation from €3,000 in 2011 to €5,200 in 2013.
- **Retail Management** June 2007 - August 2009

Dingle, Co. Kerry

 - promoted from shop floor to position of Assistant Manager where I deputised for the Store Manager.

Publications

Diaconis-Shahshahani Upper Bound Lemma for Finite Quantum Groups:
J. Fourier Anal. Appl., to appear.

Talks

The Diaconis-Shahshahani Upper Bound Lemma for Finite Quantum Groups: Irish Mathematical Society 2018 Meeting, University College Dublin.

The Diaconis-Shahshahani Upper Bound Lemma for Finite Quantum Groups:
Topological quantum groups and harmonic analysis Workshop, Seoul National University.

The Philosophy of Quantum Groups: CIT Spring Seminar Series.

The Mathematics of Card Shuffling: Presented to the Cork Science Café, at the Blackrock Castle Observatory, Cork.

Awards & Honours

Outstanding Postgraduate Demonstrator Award 2011: Shortlisted as one of three nominees in the College of Science, Engineering and Food Science.

Boole Prize: Undergraduate talk competition hosted by UCC Mathematical Society. 1st Prize 2007 with *Random Strategy*.

Superbrain: Mathematical contest hosted by the UCC Mathematical Society. Second in 2009, 2010 and 2011.

Irish Intervarsity Mathematics Competition: Qualified to represent UCC at 2008, 2010, 2011 and 2012 Intervarsities. Second in 2010.

Conferences Attended

Markovianity and Symmetry: UCC, 2018.

Quantum Information Theory: UCC, 2018.

Topological Quantum Groups and Harmonic Analysis: Workshop, Seoul National University, 2017

Topological Quantum Groups: Graduate School, Bedlewo, 2016.

Quantum Probabilistic Symmetries & Quantized Boolean Algebras: UCC, 2015

Algebraic and Analytic Aspects of Quantum Lévy Processes: Greifswald, Germany, 2015

Research Visits

IMPAN: Mathematical Institute at the Polish Academy of Sciences, Warsaw, May 2018.

Memberships

Irish Mathematical Society

Academic Council, CIT

Research & Innovation Committee, CIT

Department of Mathematics Research Committee, CIT

Other Activities

J.P. McCarthy Math Page: Developed an interactive webpage on wordpress.com for research, teaching and miscellaneous mathematics topics.

Leaving Certificate Applied Mathematics I have prepared a number of second level students for the examination. (2010-present)

Maths Circles Ran Maths Circles — maths enrichment for strong first year students — in Douglas Community School, Cork & Coláiste an Phiarsaigh, Glanmire; 2011.

Referees

Dr Stephen Wills,
School of Mathematical Sciences,
University College Cork.
Phone: 021-4205859
s.wills@ucc.ie

Dr David Goulding,
(Acting) Head, Departments of Mathematics,
Cork Institute of Technology.
Phone: 021-4335123
david.goulding@cit.ie

Appendix: Module Outlines

- MATH7021 — This module covers linear systems; the method of undetermined coefficients and Laplace transforms for the solution of linear differential equations; multiple integrals.
- MATH7019 — This module covers interpolation and curve fitting; Taylor series in one and two variables; differential equations with applications to static beams; probability distributions, statistical inference and control charts.
- MATH7016 — This is a second course in numerical techniques, introducing the student to solving physical problems represented by differential equations.
- MATH6040 — This module builds on the learner's previous knowledge and understanding of differential and integral calculus. New techniques and applications of differentiation are included. The learner is also introduced to the theory and applications of vectors and matrices.
- MATH6038 — This module involves the study of matrices, statistics and probability distributions.
- MATH6037 — This module contains further calculus including methods of integration and partial differentiation. An introduction to numerical methods and the theory of Laplace transforms completes the module.
- MATH6015 — This module introduces differential and integral calculus and treats applications pertinent to the student discipline.
- MATH6014 — An introduction to fundamental mathematical calculations and problem solving aimed at consolidating and developing student competence in the mathematical techniques which are central to scientific and engineering programmes.
- MATH6055 — Mathematics is an important component of Computer Science. This module offers a first introduction to some of the principles that computer scientists will use and apply to solving everyday tasks and introduces students to sets, relations, combinatorial graphs, functions and recurrence relations.
- MATH6000 — This module is about numeracy and basic algebraic competence. Its aim is to ensure that the first-year student acquires proficiency across the spectrum of numerical and algebraic skills needed for the study of science and engineering subjects.
- STAT6000 — This module covers basic statistical analysis, elementary probability along with discrete and continuous probability distributions. The exposition places emphasis on practical applications assisted by a statistical software package (Minitab or an equivalent).
- MB5003 — Calculus of two or more variables; a review of vectors and introduction of vector functions; multi-variable calculus: partial differentiation; Taylor's expansion; maxima/minima points; interpretation of scalar and vector fields: grad, div and curl identities; various coordinate systems: polar; cylindrical and spherical coordinates; line and area integrals; surface and volume integrals.

- MB5021 — Functions; limits; continuity; differentiation; sequences.
- MB5014 — Problem solving; experimentation, heuristics; generalisation and specialisation; exploiting symmetry; strategy and control.
- MS3011 — Discrete time systems, fixed point and stability analysis, complex dynamics, applications, limiting behaviour, families of discrete dynamical systems, chaos theory.
- MS2002 — Techniques and applications of integration of functions of one variable; solution of ordinary differential equations.
- MS2001 — Limits, continuity and derivatives of functions of one variable. Applications.
- MA1008 — Functions, limits, continuity, methods and applications of differentiation and integration, sequences, power series, Taylor expansions. First-order ordinary differential equations and linear 2nd-order ordinary differential equations. Matrices, solutions of simultaneous linear equations, determinants, eigenvalues and eigenvectors. Introduction to multivariable calculus: partial derivatives, tangent planes. Complex numbers, exponential and trigonometric functions.