THE UNIVERSITY OF AUCKLAND
NEW ZEALAND
Te Whare Wānanga o Tāmaki Makaurau

University of Auckland
Standard
ACADEMIC CV

NAME: Eamonn A. O'Brien

CURRENT POSITION: Professor of Mathematics

DEPARTMENT: Mathematics

FACULTY: Science

EDUCATIONAL QUALIFICATIONS:

- June 1983: BSc degree with First Class Honours in Mathematics from the National University of Ireland (Galway).
- June 1988: PhD in mathematics from the Australian National University.

PREVIOUS APPOINTMENTS:

- Jan 2013–Jan 2016: Head, Department of Mathematics, University of Auckland.
- February 2006–Present: Professor in Department of Mathematics, University of Auckland.
- May 2002–February 2006: Associate Professor in Department of Mathematics, University of Auckland.
- February 1999–April 2002: Senior Lecturer in Department of Mathematics, University of Auckland.
- February 1997–January 1999: Lecturer in Department of Mathematics, University of Auckland.
- November 1995–January 1997: Alexander von Humboldt Foundation Research Fellow at RWTH Aachen, Germany.
- July 1990–August 1995: Research Fellow in the School of Mathematical Sciences at the Australian National University.
- August 1988–June 1990: Tenure-track appointment as an Assistant Professor of Mathematics and Computer Science at Marquette University, Wisconsin. (Resigned to take up ANU Fellowship.)

AWARDS AND DISTINCTIONS:

- Elected as Fellow of the American Mathematical Society November 2025.
- Awarded Research Prize of the Alexander von Humboldt Foundation (Bonn) in March 2024.
- Appointed as member of Marsden Fund Council and Chair of its MIS Panel in June 2025.
- Appointed Cochair of MIST Panel for (now cancelled) 2026 PBRF Round.
- Awarded 2021 Kalman Prize for Best Paper published in last 5 years by New Zealand mathematician. ("Surjective word maps and Burnside's p^aq^b theorem", *Invent. Math.* **213**, 589–695, 2018.)
- Awarded Research Excellence Medal by University of Auckland in May 2021.
- Awarded Hector Medal in 2020 by Royal Society of New Zealand

"for the development of highly effective algorithms for group theory, widely used in computational algebra systems, and their application to answer major long-standing research problems".

- Joint organiser of workshop at Institute for Mathematical Sciences of the National University of Singapore on "Computational Aspects of Thin Groups", June 2024.
- Invited member of Isaac Newton Institute program "Groups, representations and applications: new perspectives", January–March 2020, and July 2022.
- Codirector, jointly with Andre Nies (Auckland) and Katrin Tent (Münster), of a trimester research program entitled "Logic and Algorithms in Group Theory" at the Hausdorff Research Institute for Mathematics (Bonn), September – December 2018; also followup conference August 2025.
- Awarded Hood Fellowship by University of Auckland July 2016.
- Elected as Fellow of the Royal Society of New Zealand in November 2009.
- Won the 2004 New Zealand Mathematical Society Research Award

  "For outstanding achievements in using computation, backed up by deep algebraic theory, to solve long-standing and difficult problems in group theory."
- Awarded NZIMA Maclaurin Fellowship May 2007.
- Member of Editorial Boards of *J. Algebra* (2004-ongoing); *International J. of Algebra and Computation* (2016-ongoing); *New Zealand J. of Mathematics* (2010-ongoing); and *J. Austral. Math. Soc.* (2002-2012). Appointed Managing Editor *J. Algebra* (Computational Section) January 2018.
- Recipient of Marsden Fund Awards: 1998–2001, 2001–2004, 2004–2007, 2007–2010, 2011–2014, 2014–2017, 2018–2020, 2021-2023, 2024-2027.
- Awarded a Research Fellowship by the Alexander von Humboldt Foundation (Bonn) in 1995.
- Invited member of EPFL Program on "Local representation theory and simple groups", September 2016.
- Invited member of MSRI Program on "Representation Theory of Finite Groups and Related Topics", February 2008.
- "Research-in-Pairs" Fellowship, Oberwolfach, June 2006.

TEACHING AND PROMOTION OF MATHEMATICS:

The following is a summary of my teaching philosophy.

Teaching and research are intimately linked and form complementary components of a high-quality academic environment. It is an ongoing and indispensable challenge to the professional mathematician to convey some of the excitement and beauty and challenge of mathematics to students. Teaching is an evolving experience, where the lecturer can and should learn from the classroom experience, including the feedback offered by students, the relative effectiveness of various teaching methods.

- I have been advisor or supervisor for the following graduate students at Auckland: Shuanyang Hu (PhD 2025-present, jointly with Jianbei An); Meizheng Fu (PhD 2022-2025); Simon Goodwin (MSc 2021); Anton Baykalov (PhD 2018-2021, jointly with Jianbei An); Giovanni de Franceschi (PhD 2019, jointly with Jianbei An); Kenneth Clarkson (MSc 2014); Antoine Nectoux (PhD, 2014) (jointly with Jianbei An); Paul Dick (Masters, 2010); Matthew Auger (PhD, 2010) (jointly with Marston Conder); Tara Bonda (Masters, 2006); T. Zhang (Masters, 2005); Shih-Chang Huang (PhD, 2004, Top Achiever Doctoral scholarship) (jointly with Jianbei An); Sasha Rubin (PhD, 2004) (advisor with B. Khoussainov and Marston Conder) Sanja Todorovic-Vasiljevic (PhD, 2001) (jointly with Marston Conder); Kaiman Zhang (Masters, 2005) (jointly with Jianbei An); Yeo-hoe Chung (Masters, 1998).

  In addition, I have supervised 25 Summer Scholars (Auckland); 10 Masters Project students (Auckland); and one 4th year student (ANU).

  I was advisor for five PhD graduates at the ANU: D.L. Flannery (1992), A.C. Niemeyer (1993), W. Nickel (1993), M.J. Smith (1994), A. McManus (1997).

- Mentor for the following Postdoctoral Fellows: Shih-Chang Huang (2004-2006); Laura Ciobanu (2005-2007); Henrik Bäärnhielm (2008); Heiko Dietrich (2009-2010); Sebastian Jambor (2013-2014); Alastair Litterick (2013-2015); and Matthew Conder (2020-2022). These were funded by various grants for which I was sponsor or principal applicant.
- I have been chairman and active participant in reviews of the Department's course offerings, conducted in 1998, 2002-2003, 2009-2011.
- Joint organiser of the Summer Workshops of the New Zealand Mathematics Research Institute in January 2004 ["Computational Algebra and Number Theory", Nelson]; in January 2005 ["Geometry: Interactions with Algebra and Analysis", Napier]; in January 2010 ["Groups, Representations and Number Theory", Hanmer Springs]; in January 2018 ["Algebra and Representation Theory", Nelson]; and January 2027 ["Group, graphs, combinatorics", Nelson]. These meetings, focusing on particular topics of contemporary significance in mathematics, attract some of the world's leading mathematicians to give short courses of lectures suitable for senior undergraduates and graduate students.

RESEARCH:

Summary Statement:
My primary area of research is group theory. In particular, I am actively involved in the theoretical development, high-quality implementation, analysis, and application of algorithms for group theory. I am the author of 95 peer-reviewed papers, 9 conference papers, and two research monographs.
Specific research interests include the following:

- Finitely-presented groups: Development of algorithms to obtain "useful" descriptions for these and for particular quotients, particularly those which are nilpotent or soluble; structural investigations of such groups. Algorithms for computing with polycyclic groups: in particular, automorphism group calculations and isomorphism testing. See, for example, [3], [4], [5], [7], [15], [28], [29] and [34].
- Modular representation theory: Development of algorithms which permit structural investigations and recognition of matrix groups defined over finite fields. See, for example, [13], [14], [16], [17], [30] and [35]. Character-theoretic and block investigations of sporadic simple groups. See, for example, [19], [25] and [31].
- Application of algorithms to characterisation and classification of groups. See, for example, [4], [10], [18], [20], [27], [36] and [39].
- Geometrical and discrete combinatorial questions. See, for example, [6] and [41].
- Development of databases for groups. See, for example, [9] and [37].

Research Grants / Funding:

- 2024–2027: Joint recipient (with An and Conder) of research award from New Zealand Marsden Fund.
- 2021–2023: Joint recipient (with An and Conder) of research award from New Zealand Marsden Fund.
- 2020-2022: Recipient of University of Auckland Postdoctoral Fellowship held by Matthew Conder.
- 2018–2020: Joint recipient (with An and Conder) of research award from New Zealand Marsden Fund.
- 2014–2017: Joint recipient (with An and Conder) of research award from New Zealand Marsden Fund.
- 2011–2014: Joint recipient (with An and Conder) of research award from New Zealand Marsden Fund.
- 2009-2011: Recipient of University of Auckland Postdoctoral Fellowship held by Heiko Dietrich.
- 2008–2011: Joint recipient (with An and Conder) of research award from New Zealand Marsden Fund.
- 2004–2007: Joint recipient (with An and Conder) of research award from New Zealand Marsden Fund.
- 2005-2008: Recipient of University of Auckland Postdoctoral Fellowship held by Laura Ciobanu and Henrik Bäärnhielm.
- 2004–2006: NZIMA Research Programme, "Geometry: Interactions with Algebra and Analysis", funded at $325000, codirected by Gaven Martin.

- 2001–2005: Joint recipient (with An and Conder) of research award from New Zealand Marsden Fund.
- 1998–2001: Joint recipient (with An and Conder) of research award from New Zealand Marsden Fund.
- 1998–present: Recipient of approximately EUR30000 by Humboldt Foundation for follow-up research interchanges with German research collaborators.
- Nominator and host for University of Auckland Foundation and Distinguished Visitors: Professors Jonathan Alperin (Chicago), 2003, and John Conway (Princeton), 2005.
- 2001 and 2004: University of Auckland International Research Collaboration awards to fund research visits by Professors R.A. Wilson (Birmingham) and W.M. Kantor (Oregon).
- 1997 & 1998: Member of group awarded a total of $130000 for computational support by Auckland University Research Committee.
- 1997 & 1998: Recipient of two awards from University of Auckland Staff Research Fund.
- 1998–2001: Associate Investigator for ARC Large Grant application held by Professor Cheryl E. Praeger, University of Western Australia.
- 1994–1995: Recipient of three awards under ANU Institute of Advanced Studies/State University Collaborative Scheme.

Invited Lectures:

- "Tensor Isomorphism: Algorithms, Geometry and Applications", Shonan Center, Japan; May 25-29, 2026.
- Oberwolfach Forschungsinstitut Computational Group Theory, June 2025.
- Joint meeting of the American, Australian, and New Zealand Mathematical Societies, Auckland, December 2024.
- "The Australian Algebra Conference", Melbourne, November 2023.
- "The Fourth International Conference On Group Actions and Symmetrical Graphs", Shenzhen, China, November 2023.
- "Groups and Computation: Interactions between geometric group theory, computability, and computer science", New Jersey, June 2023.
- "Pushing the Limits of Computational Combinatorial Constructions", IBFI Dagstuhl, Saarbrücken, Germany, April 2023.
- "Group Theory", Ischia, June 2022.
- "Groups and Geometries" meeting, MATRIX, The University of Melbourne, 29 November – 3 December 2021.
- Oberwolfach Forschungsinstitut Computational Group Theory, August 2021.
- "Algorithms for linear groups", Banff, June 2020.
- Two lectures as part of introductory workshop at Newton Institute Program "Groups, representations and applications: new perspectives", January 2020.
- "Groups and Geometry", Banff, August 2019.
- "Matrix group recognition: motivating new advances", Summer School, RWTH Aachen, July 2019.
- "Modern analysis and geometry", Massey University, January 2019.
- "Groups, Geometry, Representations", Oxford University, September 2018.
- "Simple Groups: New Perspectives and Applications", Bristol, August 2018.
- "Group Theory and Algebraic Combinatorics", Sobolev Institute of Mathematics, Novosibirsk State University, July 2017.
- Lecture series and conference lecture at Harish-Chandra Research Institute, Allahabad, November 2016. (Declined due to other commitments.)

- 2016 EPFL Program on "Local representation theory and simple groups", a 6-hour lecture series, September 2016.
- Oberwolfach Forschungsinstitut Computational Group Theory, August 2016.
- Computation in geometric and combinatorial group theory ICMS, Edinburgh, July 2016.
- XXI Coloquio Latinoamericano de Álgebra, Buenos Aires, July 2016.
- "Algebraic Combinatorics and Group Actions", Herstmonceux Castle, UK, July 2016. (Declined due to other commitments.)
- "Algebra and Number Theory Symposium celebrating 75th birthdays of Rudolf Maier and Said Sidki", Universidade de Brasília, January 2016.
- "Finite Simple Groups: Thirty Years of the Atlas and Beyond", Princeton University, November 2015.
- "Simple groups, representations, and related topics", Cambridge, July 2015.
- "Computations in groups and algebras", Jena, February 2015.
- "Algorithms for linear groups", Banff, November 2014.
- "Geometric and Asymptotic Group Theory with Applications", Newcastle, Australia, July 2014.
- "Algebra, Geometry and Computation", Eindhoven University, June 2014.
- "Group Theory", Ischia (Italy), March 2014.
- Second International conference on Group actions and transitive graphs, Yunnan University (China), September 2013.
- Third International Symposium on Groups, Algebra, and related topics, Peking University, June 2013.
- Second Biennial International Group Theory Conference, Istanbul, February 2013.
- Special Session on Mathematics of Computation: Algebra and Number Theory at 2013 AMS Joint Mathematics Meeting, San Diego, January 2013. (Declined due to other commitments.)
- XIX Coloquio Latinoamericano de Algebra, Pucon, Chile, December 2012.
- Words and Growth, IAS, Hebrew University June 2012.
- Symmetries of Discrete Objects, Conference and MAGMA Workshop, Queenstown, February 2012. (Two lectures)
- Computer Algebra workshop, Hannover University, November 2011.
- Oberwolfach Forschungsinstitut Computational Group Theory, August 2011.
- "Groups and Additive Combinatorics" part of the Newton Institute "Discrete Analysis" program, June 2011.
- "Groups, Actions, Computation", Harish Chandra Institute [series of lectures], September 2010.
- "Algorithmic problems in group theory and related areas", Summer School, Institute of Mathematics, Novosibirsk [series of lectures], August 2010.
- "Algebra, Algorithms, Applications", De Brún Centre for Computational Algebra, Galway, December 2009.
- Plenary speaker, "Groups St Andrews", Bath 2009. Series of four lectures.
- Workshop on Matrix Group Recognition, ICMS, Edinburgh, July 2009.
- "Group Theory", University of Warwick, July 2009.
- British Mathematical Colloquium, Galway, April 2009.
- "Group Theory, Combinatorics, and Computation", University of Western Australia, January 2009.
- "Groups and Computation", Columbus, Ohio, March 2008.
- "Finite groups and representations", Kaikoura, January 2008.
- "Groups and Computation", Queen Mary, University of London, July 2006.

- Oberwolfach Forschungsinstitut Computational Group Theory, July 2006.
- "Asymptotic Group Theory", Jerusalem, May 2006.
- New Zealand Mathematics Colloquium, Massey University, December 2005.
- "Group theory and algebraic geometry", University of Warwick, August 2005.
- "ALOCOMA 05", Bayreuth, April 2005.
- "Finite Geometries, Groups and Computation", Colorado, September 2004.
- German Mathematical Society Meeting, Heidelberg, September 2004. Section on Computer Algebra.
- "Lie Algebras", Braunschweig, May 2004.
- "Groups and Computation", Columbus, Ohio, March 2003.
- Oberwolfach Forschungsinstitut Computational Group Theory meeting, July 2001.
- "Group Theory Day", Queen Mary, University of London, June 2000.
- "Group Theory", Galway, May 2000.
- "Groups and Geometries", Milan, May 2000.
- "Group Theory and Computation", Sydney, November 1999.
- "Groups and Computation", Columbus, Ohio, June 1999.
- "Groups and Probability", Jerusalem, March 1998.
- "Workshop on finitely-presented groups", Trento, Italy, June 1997. Series of 3 lectures.
- Oberwolfach Forschungsinstitut Computational Group Theory meeting, June 1997.
- "Computational Representation Theory", IBFI Dagstuhl, Saarbrücken, Germany, May 1997.
- "Group Theory – 20th Anniversary meeting", Galway, May 1997.
- "Geometric Group Theory", Australian National University, July 1996.
- "International Research Workshop on Geometry, Combinatorial Designs and Related Structures", Greece, June 1996.
- "Workshop on Algorithms and Software for Groups, Automata, and Semigroups", an NSF-funded workshop for thirty leading experts at the Geometry Center of the University of Minnesota, August 1995.
- "Groups and Algebras", University of Auckland, July 1995.
- "Groups and Computation", Discrete Mathematics and Theoretical Computer Science Centre, Rutgers University, June 1995.
- "Computational aspects of geometric group theory", an NSF-funded workshop for twenty leading experts at the Geometry Center of the University of Minnesota, January 1994.
- "Computational Algebra", University of London, August 1993.
- Oberwolfach Forschungsinstitut Computational Group Theory meeting, June 1992.
- Oberwolfach Forschungsinstitut p-group meeting, April 1992.
- "Symbolic Software for Mathematical Research", Discrete Mathematics and Theoretical Computer Science Centre, Rutgers University, March 1991.
- "Groups and Computation", Warwick University, March 1991.
- CAYLEY workshop on symbolic and algebraic computation, "Groups – St Andrews", St Andrews, August 1989.
- Special Session on Computational Group Theory, American Mathematical Society Meeting, Phoenix AZ, January 1989.
- Oberwolfach Forschungsinstitut Computational Group Theory meeting, May 1988.

Invited short courses:

- "Computer algebra", Summer School, RWTH Aachen, a 4-hour lecture course, September 2021.
- 2016 EPFL Program on "Local representation theory and simple groups", a 6-hour lecture series, September 2016.
- 2015 PhD Summer School in Discrete Mathematics Rogla, Slovenia, a 6-hour lecture series, June 2015.
- XXII Brazilian Algebra meeting, Salvador, Brazil, a 5-hour lecture series, July 2012.
- DFG Summer school on "Computational group theory", a 4-hour lecture series, Frankfurt-Hahn, August 2011.
- Algebra Summer School, an 8-hour lecture series, International Mathematical Research Center, Peking University, May 2009.
- "Group Theory, Combinatorics, and Computation", a 4-hour lecture series, University of Western Australia, January 2009.
- ICE-EM/AMSI Summer School: a 14-hour lecture series on "Computational Group Theory", Melbourne, February 2006.

Distinguished Vistors:

I have been host to approximately 100 international visitors from leading research institutions. These include: Jonathan Alperin (Chicago), Persi Diaconis (Stanford), Marcus du Sautoy (Oxford), Gunter Malle (Kaiserslautern), John Conway (Princeton), Cheryl Praeger (Western Australia), Martin Liebeck (Imperial), Charles Leedham-Green (QMUL) and Aner Shalev (Jerusalem).

I have also hosted Dr Sebastian Jambor (Aachen) as a Post-Doctoral Fellow and Professors Bettina Eick (Braunschweig) and Christopher Voll (Bielefeld) as Feoder Lynen Fellows funded by the Humboldt Foundation.

Selected Invited Seminars:

Below is a selection of universities where I have delivered invited lectures on my research:
University of Chicago; Oxford University; Yale University; Stanford University; Imperial College; Cambridge University; University of Warwick; University of Birmingham; University of Glasgow; University of Manchester; University of Wisconsin (Madison); University of Georgia (Athens); University of Florida (Gainesville); Wayne State University; University of London; University of St Andrews; University of Newcastle; Institute for Research in Applications of Computer Algebra (Amsterdam); University of Eindhoven; Academia Sinica, Taipei; National Taiwan University; University of Western Australia; University of Sydney; RWTH Aachen; Universität Essen; Paderborn Universität; University of Dresden; University of Bielefeld; University of Bar-Ilan.

CONTRIBUTIONS TO THE DISCIPLINE:

Editorial activities

- Member of Editorial Board, International Journal of Algebra and Computation, 2016–ongoing.
- Member of Editorial Board, Journal of Algebra, 2004–ongoing. Appointed Managing Editor Journal of Algebra (Computational Section) January 2018.
- Invited Guest Editor (joint with John Cremona and Jon Carlson) of special issue of *J. Algebra*, which appeared August 2009.
- Invited Guest Editor (joint with Derek F. Holt) of special issue of *J. Algebra*, which appeared June 2006.
- Editorial Board Member (Group Theory and Computational Algebra) of Journal of the Australian Mathematical Society, 2002–2012.
- Invited Guest Editor of two special issues of *J. Austral. Math. Soc.* October and December 1999.

- Member of GAP Council (1997-2002) by invitation: policy and editorial council for computational algebra system GAP.

Assessment and review

- Frequent reviewer for *Mathematical Reviews*.
- Referee for approximately 20 international journals, including *London Math. Soc., Trans. Amer. Math. Soc.*, and *J. Algebra*.
- Member of appointment panel for Chair of Pure Mathematics, University of Otago (March 2009).
- Grant assessor for various research funding agencies, including
  - EPSERC (UK);
  - Australian Research Council;
  - National Security Agency (USA);
  - National Science Foundation (USA);
  - European Union Framework Programme;
  - Netherlands Organization for Scientific Research;
  - CIVR (Italy);
  - Portuguese Foundation for Science and Technology;
  - Science Foundation (Ireland).

Conference and other organisation

- Joint organiser of "Computational Algebra and Magma", Sydney, November 2023.
- Joint organiser of "Computational Group Theory", Oberwolfach, July 2011, July 2016 and August 2021.
- Joint organiser of "Algorithms for linear groups", Banff, November 2014 and June 2020.
- Joint organiser of "Computational and algorithmic methods", a workshop held as part of Newton Institute Program January 2020.
- Joint organiser for New Zealand Mathematics Research Institute Summer Meeting, Nelson, January 2018.
- Joint organiser of "Questions, algorithms, and computations in abstract group theory", May 2013, TU Braunschweig.
- Joint organiser of "Groups and semigroups", Lisbon, Portugal, August 2011.
- Joint organiser of "5th de Brun workshop", Galway, Ireland, April 2011.
- Joint organiser for New Zealand Mathematics Research Institute Summer Meeting, Hanmer Springs, January 2010.
- 2004–2006: Director (joint with Gaven Martin) for "Geometry: Interactions with Algebra and Analysis", an NZIMA Research Programme.
- Organiser of international conference on "Geometry and Algebra", at University of Auckland, February 2005.
- Joint organiser for New Zealand Mathematics Research Institute Summer Meeting, Napier, January 2005.
- Joint organiser for New Zealand Mathematics Research Institute Summer Meeting, Nelson, January 2004.
- Joint organiser of international conference on "Finitely-presented groups: questions and algorithms", Trento, July 2001.
- Joint organiser of international conference on "Group Theory and Computation", Sydney, November 1999.
- Joint organiser of Special Session at Joint Meeting of American and Australian Mathematical Societies, Melbourne, July 1999.

- Organiser for research miniconferences and workshops held at Auckland: February 1999; February 2002; January 2004; June 2005.

Recent and ongoing roles

- 2025– : Member of Marsden Fund Council and Chair of its MIS Panel.
- 2023-2024: Appointed by New Zealand Tertiary Education Commission as Co-Chair of Mathematical and Information Sciences and Technology Panel for (now cancelled) 2026 Research Quality Evaluation Exercise.
- 2012 and 2018: Member of TEC Mathematical and Information Science PBRF assessment panel.
- 2010-2014: Member of Royal Society of New Zealand Fellowship Selection Panel; Chair of panel 2014.
- 2015-2019: Chair of New Zealand Mathematical Society Prize Committee.
- 2017-2022: President of the New Zealand Association of von Humboldt Fellows.
- 2015, 2017, 2025: Panel member for various awards of the Royal Society of New Zealand.
- 2016– : Director of the New Zealand Mathematics Research Institute.
- Head of Department of Mathematics, University of Auckland, 2013-2015.