

Curriculum Vitae

DOMINIC VERITY

Centre of Australian Category Theory
School of Mathematical and Physical Sciences
Faculty of Science and Engineering
Macquarie University, Sydney, NSW 2109, Australia



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Current positions

Emeritus Professor of Pure Mathematics, Macquarie University

Areas of research interest

Higher Category Theory • Homotopy Theory • Programming Languages

APPOINTMENTS HELD

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| 2020-2021 | <i>Professor of Pure Mathematics</i> , Department of Mathematics and Statistics, Faculty of Science and Engineering, Macquarie University, Australia |
| 2012-2020 | <i>Professor of Computing</i> , Department of Computing, Faculty of Science and Engineering, Macquarie University, Australia |
| 2013-2016 | <i>Chair of Academic Senate</i> , Vice-Chancellor's Office, Macquarie University, Australia |
| 2001-2007 | <i>Director of Postgraduate Programs</i> , Division of ICS, Macquarie University, Australia |
| 2001-2012 | <i>Associate Professor</i> , Department of Computing, Macquarie University, Australia |
| 2000-2001 | <i>Senior Lecturer</i> , Department of Computing, Macquarie University, Australia |
| 1999-2000 | <i>Director and Lead Consultant</i> , Categorical Solutions Pty. Ltd., Sydney, Australia |
| 1996-1999 | <i>Head of Equity Derivative Trading</i> , HSBC James Capel, Sydney, Australia |
| 1995-1996 | <i>Senior Quantitative Analyst</i> , Equity Derivatives Trading, Deutsche Bank, Sydney, Australia |
| 1993-1995 | <i>Consultant Quantitative Analyst</i> , Bain and Company, Deutsche Bank, Sydney, Australia |
| 1993-1995 | <i>Lecturer</i> , Department of Mathematics, Macquarie University, Australia |
| 1992-1993 | <i>Research Fellow</i> , Department of Mathematics, Macquarie University, Australia |
| 1991-1992 | <i>Research Fellow</i> , Department of Pure Maths and Mathematical Statistics, Cambridge University, UK |
| 1983-1984 | <i>Computer Engineer</i> , BBC World Service, Bush House, London, UK |
| 1981-1983 | <i>Computer Programmer</i> , Acorn Computers Limited (now ARM Limited), Cambridge, UK |

EDUCATION

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| 1988-1992 | <i>PhD in Mathematics</i> , Fitzwilliam College, Cambridge University, UK. PhD Supervisor: Professor J. M. E. Hyland |
| 1987-1988 | <i>Part III Mathematics</i> , awarded with Distinction, Fitzwilliam College, Cambridge University, UK |
| 1984-1987 | <i>BSc (Hons) Mathematics</i> , Double 1 st Class, Fitzwilliam College, Cambridge University, UK |

RECENT AWARDS, INVITATIONS & HONORARY APPOINTMENTS

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| 2023 | <i>PROSE Award winner</i> , Mathematics and Statistics category, Association of American Publishers, for the book THE ELEMENTS OF ∞-CATEGORY THEORY |
| 2021- | <i>Professor Emeritus</i> , Macquarie University, Sydney, Australia, unanimously elected by University Council, 19 th August 2021 |

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| 2022- | Honorary Professor, Mathematical Sciences Institute, Australian National University, Canberra, Australia |
| 2020, 2022 | Research Professor and Program Organiser, Mathematical Sciences Research Institute (MSRI) program <i>"Higher Categories and Categorification"</i> , Berkeley (CA) USA. |
| 2019 | Visiting Research Fellow, Dept. of Mathematics, Johns Hopkins University, Baltimore (MD) USA |
| 2018 | Invited Mentor, Mass. Institute of Technology, Talbot Workshop , Course title: <i>"Model-independent theory of ∞-Categories"</i> , Portland (OR) USA |
| 2017 | Invited Lecturer, AMSI Summer School 2017, Course title: <i>"Category Theory and Computer Science"</i> , Sydney University, Australia. |
| 2016 | Visiting Professor, Dept. of Mathematics and Mathematical Statistics, Cambridge University, UK |
| 2016 | Visiting Research Fellow, Max Planck Institute for Mathematics, Bonn, Germany |
| 2015, 2016 | Visiting Research Fellow, Dept. of Mathematics, Johns Hopkins University, Baltimore MD, USA |
| 2012-2015 | Associate in Mathematics, Dept. of Mathematics, Harvard University, Cambridge MA, US (various separate appointments) |
| 2011 | Invited Participant, Mathematisches Forschungsinstitut Oberwolfach, Mini-workshop: <i>"The homotopy interpretation of constructive type theory"</i> , Germany |
| 2011 | National Citation for Outstanding Contribution to Student Learning, Australian Learning and Teaching Council (ALTC), <i>"For a decade of inspirational and innovative educational leadership in the field of Information Technology"</i> |
| 2009 | Vice Chancellor's Award for Teaching Excellence, Macquarie University, <i>"For leadership and development of postgraduate and professional development programs in Information Technology"</i> |
| 2006 and 2009 | Visiting Research Fellow, Fitzwilliam College and Visiting Professor, Department of Pure Mathematics and Mathematical Statistics, Cambridge University, UK |

EXTERNALLY FUNDED GRANTS

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| 2023-2026 | US Army Research Office, BAA Fundamental Science 80600-NC-INT , <i>"Towards a synthetic theory of (extended) TQFTs"</i> , AU\$470,000 |
| 2019-2022 | (with R. Street, S. Lack & R. Garner) Australian Research Council, Discovery Project DP190102432 , <i>"Working synthetically in higher categorical structures"</i> , AU\$453,000 |
| 2016–2018 | (with R. Street, S. Lack & R. Garner) Australian Research Council, Discovery Project DP160101519 , <i>"Monoidal categories and beyond: new contexts and new applications"</i> , AU\$580,900 |
| 2015–2018 | (with M. Hillier, A. Fluck et. al.) Australian Government Office of Learning and Teaching, <i>"Transforming exams across Australia: processes and platform for e-exams in high stakes, supervised environments"</i> , AU\$500,000 |
| 2013-2015 | (with R. Street, S. Lack & R. Garner) Australian Research Council, Discovery Project DP130101969 , <i>"Structural homotopy theory: a category-theoretic study"</i> , AU\$600,000 |
| 2010-2012 | (with R. Street, M. Johnson & S. Lack) Australian Research Council, Discovery Project DP1094883 , <i>"Applicable Categorical Structures"</i> . AU\$290,000 |
| 2007-2009 | (with R. Street, M. Johnson & S. Lack) Australian Research Council, Discovery Project DP0771252 , <i>"Cohomology enhanced: an application of enriched and higher categories"</i> . AU\$276,000 |

PHD STUDENTS

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| 2021 ongoing | (with R. Garner) Yao Tang, <i>"Higher categories and dependently typed logics"</i> |
| 2020 ongoing | (with S. Lack) Nicola Di Vittorio, <i>"Higher derivators as a foundation for ∞-category theory"</i> |
| 2018 ongoing | (with R. Garner) Paula Verdugo, <i>"Synthetic ∞-category theory"</i> |
| 2020 awarded | (with R. Street) Yuki Machara, <i>"The Gray tensor product for 2-quasi-categories"</i> , Vice-Chancellor's Medal for Excellence |
| 2018 awarded | (with R. Garner) Edoardo Lanari, <i>"Cylinder objects for Grothendieck-Maltsiniotis ∞-groupoids"</i> |
| 2015 awarded | (with R. Garner) Mitchell Buckley, <i>"Three studies in higher category theory: fibrations, skew monoidal structures and excision of extremals"</i> |
| 2015 awarded | (with R. Garner) Matthew Burke, <i>"Synthetic Lie Theory"</i> |
| 2012 awarded | (with R. Street) Thomas Booker, <i>"Generalized and particular monoidal categories, and structures therein"</i> |
| 2012 awarded | (with R. Street) David Oury, <i>"Duality for Joyal's category Θ and homotopy concepts for Θ-sets"</i> |
| 2011 awarded | (with M. Johnson) Micah McCurdy, <i>"Cyclic $*$-autonomous categories and the Tannaka adjunction via graphical methods"</i> |
| 2011 awarded | (with A. Sloane) Matthew Roberts, <i>"Compiled generics for functional programming languages"</i> |

2010 awarded (with P. Watters) Wai Han Ho, *"On the evaluation of face identification systems"*
2007 awarded (with A. Sloane) Ekaterina Stefanov, *"Simple code compression and customisation for bytecode for interpreters"*

PUBLICATIONS & TALKS

Books and memoirs

- 2022- (with E. Riehl) MORE ELEMENTS OF ∞ -CATEGORY THEORY, <https://emilyriehl.github.io/files/more-elements.pdf>, book draft under development.
- 2022 (with E. Riehl) THE ELEMENTS OF ∞ -CATEGORY THEORY, volume 194 of *Cambridge Studies in Advanced Mathematics*, Cambridge University Press, frontmatter i–xix, pages 1–759. February 2022
- 2011 ENRICHED CATEGORIES, INTERNAL CATEGORIES AND CHANGE OF BASE, *Reprints in Theory and Application of Categories*, 20:1–266
- 2008 COMPLICIAL SETS, CHARACTERISING THE SIMPLICIAL NERVES OF STRICT Ω -CATEGORIES, volume 193 of *Memoirs of the AMS*. American Mathematical Society

Selected articles and preprints

- 2021 (with E. Riehl, submitted) CARTESIAN EXPONENTIATION AND MONADICITY, <https://arxiv.org/abs/2108.11786>, 1–71, submitted to *Cahiers de Topologie et Géométrie Différentielle Catégoriques*.
- 2023 (with M. Rovelli and V. Ozornova, accepted) GRAY TENSOR PRODUCTS AND SATURATED N -COMPLICIAL SETS, <https://arxiv.org/abs/2007.01235>, *Higher Structures* to appear.
- 2020a (with E. Riehl) ON THE CONSTRUCTION OF LIMITS AND COLIMITS IN ∞ -CATEGORIES THEORY AND APPLICATIONS OF CATEGORIES, 35 (2020), 1101–1158.
- 2020b (with E. Riehl) INFINITY CATEGORY THEORY FROM SCRATCH, *Higher Structures*, 4(1) (2020), 115–167. (invited publication)
- 2020c (with E. Riehl) RECOGNIZING QUASI-CATEGORICAL LIMITS AND COLIMITS IN HOMOTOPY COHERENT NERVES, *Applied Categorical Structures*, 28 (2020), 669–716.
- 2018 (with E. Riehl) THE COMPREHENSION CONSTRUCTION, *Higher Structures*, 2(1) (2018), 116–190.
- 2017b (with E. Riehl) KAN EXTENSIONS AND THE CALCULUS OF MODULES FOR ∞ -CATEGORIES, *Algebraic and Geometric Topology*, 17-1 (2017) 189–271.
- 2017a (with E. Riehl) FIBRATIONS AND YONEDA’S LEMMA IN AN ∞ -COSMOS, *Journal of Pure and Applied Algebra*, 221(3) (2017) 499–564.
- 2016a (with E. Riehl) HOMOTOPY COHERENT ADJUNCTIONS AND THE FORMAL THEORY OF MONADS. *Advances in Mathematics*, 286:802–888
- 2015b (with E. Riehl) THE 2-CATEGORY THEORY OF QUASI-CATEGORIES. *Advances in Mathematics*, 280:549–642
- 2015a (with E. Riehl) COMPLETENESS RESULTS FOR QUASI-CATEGORIES OF ALGEBRAS, HOMOTOPY LIMITS, AND RELATED GENERAL CONSTRUCTIONS. *Homology, Homotopy and Applications*, 17(1):1–33
- 2014 (with E. Riehl) THE THEORY AND PRACTICE OF REEDY CATEGORIES. *Theory and Applications of Categories*, 29(9):256–301
- 2010 (with R. Street) THE COMPREHENSIVE FACTORISATION AND TORSORS. *Theory and Application of Categories*, 23(3):42–75
- 2008 WEAK COMPLICIAL SETS I, BASIC HOMOTOPY THEORY. *Advances in Mathematics*, 219:1081–1149
- 2007 WEAK COMPLICIAL SETS II, NERVES OF COMPLICIAL GRAY-CATEGORIES. In A. Davydov et al., editors, *Categories in Algebra, Geometry and Mathematical Physics (StreetFest)*, volume 431 of *Contemporary Mathematics*, pages 441–467. American Mathematical Society.
- 1995 (with A. Joyal & R. H. Street) TRACED MONOIDAL CATEGORIES, *Mathematical Proceedings of the Cambridge Philosophical Society*, 119(3):425–446

Invited Keynotes, Courses and Plenaries

- 2022 [Categories and Companions Symposium](#), MATRIX Institute, University of Melbourne, Australia. “Themes and motivations in ∞ -Cosmology”.
- 2022 [Topos Institute Colloquium](#), Berkeley (CA) USA. “Zen and the Art of ∞ -Categories”.
- 2020 INVITED MINI-COURSE, HIGHER CATEGORIES AND CATEGORIFICATION, Mathematical Sciences Research Institute, Berkeley (CA) USA, “Synthetic ∞ -category theory”.
- 2019 INVITED MINI-COURSE, FOUNDATIONAL METHODS IN COMPUTER SCIENCE, University of Calgary, Calgary Canada, “Synthetic ∞ -category theory”.

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| 2019 | INVITED SPEAKER, TERCER COLOQUIO DE CATEGORÍAS, ÁLGEBRA Y TEMAS AFINES, UNAM Oaxaca Mexico, “ <i>Synthetic ∞-category theory and ∞-cosmology</i> ” |
| 2018 | INVITED SPEAKER, DIAGRAMMATIC REASONING IN HIGHER EDUCATION, University of Newcastle, “ <i>An exploration of String Diagrams in Computer Science</i> ” |
| 2018 | INVITED MINI-COURSE, TOPOLOGY IN AUSTRALIA AND SOUTH KOREA (AMSI), POSTECH, Pohang, South Korea, “ <i>An introduction to model independent ∞-category theory</i> ” |
| 2017 | INVITED SPEAKER, CATEGORIES FOR HOMOTOPY THEORY AND REWRITING, CIRM, Luminy, France, talk entitled “ <i>A complicit compendium</i> ” |
| 2016 | INVITED SPEAKER, INTERNATIONAL CATEGORY THEORY MEETING (ICTM2016) Dalhousie University, Halifax, Canada, talk entitled “ <i>On the Yoga of (Un)straightening</i> ” |
| 2016 | INVITED SPEAKER, 31ST SUMMER TOPOLOGY CONFERENCE, University of Leicester, UK, talk entitled “ <i>A monadic account of Lurie’s (un)straightening construction</i> ” |
| 2015 | INVITED SPEAKER, JOHNS HOPKINS TOPOLOGY SEMINAR, Baltimore MD, USA, talk entitled “ <i>The Unbearable Lightness of 2-Being</i> ” |
| 2015 | PLENARY SPEAKER, INTERNATIONAL CATEGORY THEORY CONFERENCE (CT15), Aveiro, Portugal, talk entitled “ <i>The calculus of modules for ∞-categories</i> ” |
| 2014 | PLENARY SPEAKER, INTERNATIONAL CATEGORY THEORY CONFERENCE (CT14), Cambridge, UK, talk entitled “ <i>The formal theory of $(\infty, 1)$-categories</i> ” |
| 2013 | INVITED SPEAKER, HARVARD TOPOLOGY SEMINAR, Cambridge MA, USA, talk entitled “ <i>Cobordisms and weak complicit sets</i> ” |
| 2012 | INVITED SPEAKER, MIT TOPOLOGY SEMINAR, Cambridge MA, USA, talk entitled “ <i>Homotopy coherent adjunctions and the walking adjunction</i> ” |
| 2010 | PLENARY SPEAKER, INTERNATIONAL CATEGORY THEORY CONFERENCE (CT10), Genova, Italy, talk entitled “ <i>On the 2-category theory of quasi-categories</i> ” |
| 2009 | PLENARY SPEAKER, INTERNATIONAL CATEGORY THEORY CONFERENCE (CT09), Cape Town, South Africa, talk entitled “ <i>Weak complicit sets and iterated Segal spaces</i> ” |
| 2009 | PLENARY SPEAKER, 88TH PERIPATETIC SEMINAR ON SHEAVES AND LOGIC in Honour of the 60th birthdays of Professors Martin Hyland and Peter Johnstone, University of Cambridge, United Kingdom, talk entitled “ <i>On the non-canonicity of complicit stratifications</i> ” |
| 2008 | INVITED SPEAKER, AUSTRALIAN NATIONAL UNIVERSITY, Algebra Seminar, Canberra, Australia, talk entitled “ <i>Quasi-categories, weak complicit sets and manifolds</i> ” |
| 2008 | PLENARY SPEAKER, INTERNATIONAL CATEGORY THEORY CONFERENCE (CT08), Calais, France, talk entitled “ <i>Cobordisms and Weak Complicit Sets</i> ” |
| 2007 | PLENARY SPEAKER, INTERNATIONAL CATEGORY THEORY CONFERENCE (CT07), Carvoeiro, Portugal, talk entitled “ <i>Weak complicit sets and internal quasi-categories</i> ” |
| 2006 | KEYNOTE SPEAKER, 50TH ANNIVERSARY MEETING OF THE AUSTRALIAN MATHEMATICAL SOCIETY, Sydney, Australia, talk entitled “ <i>Non-abelian cohomology as the raison d’être for higher category theory</i> ” |
| 2005 | INVITED SPEAKER, STREETFEST, CONFERENCE AND WORKSHOP IN HONOUR OF ROSS STREET’S 60TH BIRTHDAY, Sydney and Canberra, Australia, talk entitled “ <i>A simplicial weak category theory</i> ” |

SERVICE

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| 2022 | MEMBER, AUSTMS ANNUAL CONFERENCE SCIENTIFIC COMMITTEE, Australian Mathematical Society and UNSW |
| 2021 | MEMBER, AUSTMS MEDAL COMMITTEE, Australian Mathematical Society |
| 2020- | MEMBER, EMERITUS PROFESSOR PANEL, responsible for making recommendations to Academic Senate regarding the appointment of Emeritus Professors, Macquarie University, Australia |
| 2017- | MEMBER, ORGANISING COMMITTEE, Mathematical Sciences Research Institute (MSRI) Scientific Program: “ <i>Higher Categories and Categorification (2020)</i> ”, Berkeley (CA), USA |
| 2016- | DEPUTY DIRECTOR, CENTRE OF AUSTRALIAN CATEGORY THEORY, Macquarie University, Australia |
| 2020-2021 | MATHEMATICS RESEARCH LEAD, Department of Mathematics and Statistics, Faculty of Science and Engineering, Macquarie University, Australia. |
| 2017-2021 | CHAIR, UNIVERSITY DISCIPLINE COMMITTEE, Macquarie University, Australia, responsible for chairing hearings of all serious student misconduct cases, appointed at the request of the Vice-Chancellor. |
| 2013-2016 | CHAIR OF ACADEMIC SENATE, responsible for leading the academic governing body of Macquarie University, http://senate.mq.edu.au , elected 2012 & 2015 |

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| 2013-2016 | MEMBER, UNIVERSITY COUNCIL, the overall governing body of Macquarie University, elected 2012 & 2015 |
| 2013-2016 | MEMBER, UNIVERSITY COUNCIL MANAGEMENT, APPOINTMENTS & AWARDS, REMUNERATION, AND DISCIPLINE COMMITTEES |
| 2011-2016 2013 | ELECTED MEMBER, ACADEMIC SENATE, elected 2010, 2012 & 2014 (with R. Garner & S. Lack) ORGANISER, INTERNATIONAL CATEGORY THEORY CONFERENCE (CT13), Macquarie University, Sydney, Australia |
| 2011-2014 | CHAIR, SENATE LEARNING AND TEACHING COMMITTEE, responsible for leading academic policy development for and oversight of Macquarie University's learning & teaching activities |
| 2011-2015 | MEMBER, MACQUARIE UNIVERSITY TEACHING EXCELLENCE ACADEMY, provide advice to the DVC Provost on all aspects of learning & teaching practice |
| 2011 | ACTING HEAD, DEPARTMENT OF COMPUTING, Macquarie University, Sydney, Australia |
| 2006-2008 | ELECTED MEMBER, ACADEMIC SENATE, elected 2005 |
| 2002-2007 | DIRECTOR, POSTGRADUATE AND PROFESSIONAL DEVELOPMENT PROGRAMS, Division of Information and Communications Sciences, Macquarie University, Sydney |
| 2002-2007 and 2011 | MEMBER, FACULTY EXECUTIVE, Division of Information and Communications Sciences, Macquarie University, Sydney |
| 2003-2007 | MEMBER, SENATE ACADEMIC PROGRAM COMMITTEE (APC) review, approval and quality assurance of all of Macquarie University's coursework programs |
| 2005-2007 | CHAIR, UNDERGRADUATE AND POSTGRADUATE SUB-COMMITTEES OF APC |

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