CURRICULUM VITAE

NAME Rodney Graham DOWNEY

Current Position Professor of Mathematics

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DATE OF BIRTH 20 September, 1957

MARITAL STATUS Married, two children

NATIONALITY New Zealand and Australian

BACKGROUND:

Academic:

1975-1978 Undergraduate at University of Queensland, St. Lucia,Queensland, Australia B.Sc. with first class honours in Mathematics

1979-1982 Postgraduate at Monash University, Clayton,Victoria, Australia, Ph.D. in mathematics (November 1982)

Professional:

1982 Lecturer in mathematics at Chisholm Institute of Technology (now Monash University), Caulfield campus, Caulfield East Victoria Australia

1983 (Spring) Visiting Assistant Professor at Western Illinois University, Macomb, Illinois, U.S.A.

1983-1985 Lecturer at National University of Singapore Kent Ridge, Republic of Singapore

1985-1986 Visiting Assistant Professor at University of Illinois at Urbana-Champaign, Urbana, Illinois, U.S.A.

1986-1987 Lecturer in Mathematics, Victoria University of Wellington, Wellington, New Zealand

1988-1990 Senior Lecturer in Mathematics, Victoria University of Wellington, Wellington, New Zealand

1989 Member, Mathematical Sciences Research Institute, Berkeley, California, USA

1991-95 Reader in Mathematics, Victoria University of Wellington, Wellington, New Zealand

1992 Visiting Scholar, Mathematics Department, Cornell University, Ithaca, New York, USA

1992 Member, Mathematical Sciences Institute, Cornell University, Ithaca, New York, USA

1993 Lee Kong Chiang Visiting Fellow, National University of Singapore.

1995 Visiting Professor, Mathematics Department, Cornell University.

1997 Visiting Scholar, University of Siena.

1999 Visiting Scholar, University of Wisconsin, Madison.

1999 Visiting Professor, National University of Singapore.

2000 Visiting Professor, University of Notre Dame, Indiana.

2001 Visiting Scholar, University of Chicago.

2003 Visiting Scholar, University of Chicago.

2005 Visiting Professor, University of Chicago.

2008 Visiting Professor, University of Chicago.

2010 Visiting Scholar, University of Chicago.

2014 Visiting Scholar, University of Chicago.

2008 Visiting Scholar, University of Madison, Wisconsin.

2005, 2011, 2017 Member, Institute for Mathematical Sciences, Singapore.

2011 Visiting Professor, Nanyang University of Technology, Singapore.

2003 Inaugural MacLaurin Fellow, New Zealand Institute for Mathematics and its Applications (Center of Research Excellence).

2008-2010 James Cook Fellow, Royal Society of New Zealand.

2009-2012 Chair MIS Panel and Member of Council, Marsden Fund.

2012 Fellow, Isaac Newton Institute, Cambridge.

2017 Fellow, Institute for Mathematical Sciences, Natioanl University of Singapore.

2017,2018 Visiting Professor, University of Heidelberg.

1995- Personal Chair, Professor of Mathematics, Victoria University of Wellington, New Zealand.

Awards

Prizes

1990 New Zealand Royal Society Hamilton Award for Science

1991 Foundation Fellow of the Institute of Combinatorics and its Applications.

1992 New Zealand Mathematical Society Award for Research.

1994 New Zealand Association of Scientists Research Medal for the best New Zealand based scientist under 40.

2007 Elected Fellow of the New Zealand Mathematics Society.

2000 Vice-Chancellor's Award for Research Excellence.

1996 Elected Fellow of the Royal Society (NZ)

2006 Invited Speaker, International Congress of Mathematicians.

2007 Invited Speaker, International Congress of Logic, Methodology, and Philosophy of Science.

2008 Elected Fellow of the Association for Computing Machinery. (one of two New Zealanders)

2008-2010 James Cook Fellowship, Royal Society of New Zealand.

2008 Victoria University of Wellington Award for Research Excellence.

2010 Shoenfield Prize (article) from the Association for Symbolic Logic.

2011 Hector Medal, Royal Society of New Zealand. (New Zealand's oldest research medal)

2012 Fellow Newton Institute (Cambridge) for the Alan Turing Programme.

2012 Elected Fellow American Mathematical Society. (Inaugural intake, one of 3 New Zealand based)

2013 Elected Fellow of the Australian Mathematical Society.

2014 European Association for Thoreretical Computer Science/International Symposium in Parameterized Complexity and Exact Computation Nerode Prize (joint with Bodlaender, Fellows, Hermelin, Fortnow and Santhanam)

2016-7 Humboldt Prize (60,000 Euros, October 2016) from Humboldt foundation.

2016 Shoenfield Prize (Book) Association for Symbolic Logic.

2018 Member $\Sigma\ \Xi$.

2018 Gödel Lecturer, Association for Symbolic Logic.

2018 Rutherford Medal ($100,000), premier award New Zealand Royal Society.

Grants

1979-1982 Commonwealth Postgraduate Research Award (Australia)

1983-1985 Research Grant (Singapore)

1986 Support Grant from U.S. National Science Foundation

1988-91, 92-95, 96-99 PI for three US/NZ Binational Cooperative Grants

1989 Support Grant from Mathematical Sciences Research Institute, Berkeley, USA

1992 Support Grant from Mathematical Sciences Institute, Ithaca New York, USA

1993 Support Grant from the Lee Foundation, National University of Singapore.

1995- PI Research Grants continuously from The Marsden Fund for Basic Science.

2005- AI on Catherine McCartin's Research Grant from The Marsden Fund for Basic Science.

1998-2004 AI on 2 Marsden Grants to support the *NZ Mathematical Sciences Research Institute,* of which I am one of the directors, along with Professors Marston Conder, David Gauld, Gaven Martin, and Vaughan Jones.

2002-10 PI on the CoRE grant from the New Zealand Government for the *New Zealand Institute for Mathematics and its Applications*

1997 Support grant from the Italian Government.

2003- AI on NSFC Grand International Joint Project Grant No. 60310213 "New Directions in Theory and Applications of Models of Computation" (China)

2005-2008 AI on Noam Greenberg's Marsden Grant.

2008-2010 James Cook Fellowship, Royal Society of New Zealand.

2011 PI on NSF Grant 1135626 with Charles Steinhorn for Travel Grants for 12 US based researchers to speak at the 12th Asian Logic Conference in Wellington, December, 2011. ($US 31K)

2014 PI on Randomness and Computation programme, Institute for Mathematical Sciences, June 2014. ($S 125K))

2016 Fellowship, Institute for Mathematical Sciences, Singapore, *Aspects of Computation.*

2018 January, Research in Pairs, Oberwolfach.

Postdoctoral Fellows Supervised.

Current or last known Position Listed.

1. Michael Moses (George Washington University)

2. Peter Cholak (University of Notre Dame)

3. Geoff LaForte (Western Florida University) (deceased)

4. Richard Coles (Telecom, UK)

5. Reed Solomon (University of Connecticut).

6. Walker White (Cornell University)

7. Denis Hirschfeldt (University of Chicago).

8. Evan Griffiths (New Zealand Risk Assessment Programme)

9. Wu Guohua (Nanyang Technological University, Singapore)

10. Joe Miller (University of Wisconsin, Madison)

11. Yu Liang (Nanjing University, China)

12. Rebecca Weber (Dartmouth)

13. Noam Greenberg (Victoria University)

14. Antonio Montalbán (Berkeley)

15. George Barmpalias (Wellington)

16. Laurent Bienvenu (CIRM Montpellier University)

17. Asher Kach (Google)

18. Dan Turetsky (Wellington)

19. Alexander Melnikov (Massey University, Albany)

20. Greg Igusa (Pure Storage, Inc)

21. Matthew Marrison-Trainor (Current)

Ph. D. Students supervised

Wu Guohua (1999-2002) (Nanyang University of Technology)

Catherine McCartin (1999-2003) (Massey University)

Ng Keng Meng (Selwyn) (2006-2009) (Nanyang University of Technology)

Adam Day (2008-2011) (Wellington)

Michael McInerney (joint with Greenberg) (2013-2016) (Nanyang University of Technology)

Day, Wu and McCartin won the *Hatherton Award* for the best paper arising from a PhD paper by a New Zealand based PhD. Day won the *Sacks Prize* for the best PhD in logic worldwide from the *Association for Symbolic Logic.* He was the first New Zealand graduate to get a Fellowship to the Miller Institute at Berkeley.

M. Sc. Student supervised

Stephanie Reid (2003), John Fouhy (2003), Michelle Porter (2015), Katherine Arthur (2015).

All received A^+ masters with distinction.

Professional Service:

- Managing Editor *Bulletin of Symbolic Logic*, 2004-2010. (full term)

- Editor *Journal of Symbolic Logic, 1999-2004*, Coordinating editor 2000-2004. (full term)

- Editor, *Theory of Computing Systems* (formerly *Math. Systems Theory*), 2006-

- Editor, *Archive for Mathematical Logic*, 2009-

- Editor, *Computability*, 2011-

- Co-director, New Zealand Mathematical Sciences Research Institute.

- Co-director, New Zealand Institute for Mathematics and its Applications.

- Vice-President, New Zealand mathematics Society 2000-2001.

- President, New Zealand Mathematical Society 2001-2003, immediate past president, 2004.

- Prizes committee, council, and Australasian committee Association for Symbolic Logic 2000-.

- Nominating committee and committee on plagarism Association for Symbolic Logic.

- Fellows' Committee Royal Society New Zealand 1999-2001. Hamilton Prize Committee, 2004.

- Marsden panel for Mathematical and Information Sciences 1997, 2002,2003 (chair 2009-2011).

- Marsden Council 2009-2011.

- Royal Society Travel Grants Committee 2008-2010

- New Zealand Mathematical Sciences Advisory Group 1999-2003.

- New Zealand representative on the International Mathematics Union 2001-2004.

- Fellows Selection Panel, Royal Society, 2005.

- Chair of the Steering Committee for *Computability, Complexity and Randomness* series 2003-.

- Steering Committee for *International Workshop of Parameterized Complexity and Exact Computation*, 2005-2009.

- Chair review committee, science faculty, University of Samoa.

- PC member of 28 computer science conference committees in the last 6 years.

- Judge, Alan Turing Research Fellowship Awards, 2012.

- Fellows panel Royal Society, 2015

- Assessor, Rutherford Discovery Fellowships (2016)

- 2015-17 Council, Asociation for Symbolic Logic.

Hobbies: Surfing, Tennis, Scottish Country Dancing.

AREAS OF INTEREST: Algebra, Logic, Complexity theory

PUBLICATIONS:

Thesis:

Abstract Dependence, Recursion Theory and the Lattice of Recursively Enumerable Filters Thesis, Monash University, Clayton, Victoria, Australia, (1982). J.N. Crossley, Supervisor.

Publications

Books

1. *Parameterized Complexity*, (with M. Fellows) Springer-Verlag, Monographs in Computer Science, 1999 xiii+533 pages.

2. *Algorithmic Randomness and Complexity* (with D. Hirschfeldt), Springer-Verlag , Computability in Europe Series No 1, December 2010. xxvi+855 pages.

3. *Fundamentals of Parameterized Complexity*, (with M. Fellows), Springer-Verlag, 2013, texts in computer science, ISBN 978-1-4471-5559-1, online http://link.springer.com/book/10.1007/978-1-4471-5559-1, xxx+763 pages.

4. *Minimal Weak Truth Table Degrees and Computably Enumerable Turing Degrees*, (with Keng Meng Ng and Reed Solomon) accepted Memoirs of the American Mathematical Society, vii + 98 pages.

5. *A Transfinite Hierarchy of Lowness Notions in the Computably Enumerable Degrees, Unifying Classes and Natural Definability*, (with Noam Greenberg) submitted, 172pp.

Books Edited

1. *Aspects of Complexity*, (with D. Hirschfeldt, editors), de Gruyter Series in Logic and Its Applications, Volume 4, 2001, vi+172 pages.

2. *Proceedings of the 7th and 8th Asian Logic Conferences*, (Chief Editor, with Ding Decheng, Tung Shi Ping, Qiu Yu Hui, Mariko Yasugi, and Wu Guohua, editors) World Scientific, 2003, viii+471 pages.

3. *Parameterized and Exact Computation: First International Workshop, IWPEC 2004, Bergen, Norway, September 14-17, 2004. Proceedings* (Rod Downey, Frank Dehne, Michael Fellows, editors) Springer-Verlag Lecture Notes in Computer Science, Vol 3162, Springer Verlag, 2004. 300 pages.

4. *Mathematical Logic in Asia: Proceedings of the 9th Asian Logic Conference,* (Rod Downey, Sergei S. Goncharov and Hiroakira Ono, eds) World Scientific, 2006, Singapore, viii+319 pages.

5. *Proceedings Fifteenth Computing: The Australasian Theory Symposium (CATS 2009)*, Wellington, New Zealand. CRPIT, 94. (Downey, R. and Manyem, P., Eds.) ACS.

6. *Proceedings of the 10th Asian Logic Conference:* (with Joerg Brendle, Chong Chi Tat, Hirotaka Kikyo, Hiroakira Ono and Feng Qi), World Scientific, 2009.

7. *The Multivariate Algorithmic Revolution and Beyond, Essays Dedicated to Michael R. Fellows on the Occasion of His 60th Birthday,* Lecture Notes in Computer Science, Vol. 7370 Subseries: Theoretical Computer Science and General Issues (Bodlaender, H.L.; Downey, R.; Fomin, F.V.; Marx, D. (Eds.)) 2012, 2012, XXII, 506 p. 32 illus.

8. *Proceedings of the 11th Asian Logic Conference*, (with Rob Goldblatt, Joerg Brendle and Bungham Kim), 2013, World Scientific, 325 pages.

9. *Turing's Legacy,* Cambridge University Press, Lecture Notes in Logic, Cambridge University Press, 2014. (Featured in the 19th Annual ACM Computing Reviews Notable Books and Articles (2014).)

Journal Special Issues Edited

1. Special Issue of the *Annals of Pure and Applied Logic* Volume 138, Issues 1-3, Pages 1-222 (March 2006), devoted to the NZIMA Logic Programme (with Rob Goldblatt).

2. Special Issue of *Theoretical Computer Science*, devoted to *Parameterized Complexity and Exact Computation*, (with Mike Langston, and Rolf Niedermeier) Volume 351, Issue 3, Pages 295-460 (28 February 2006) Parameterized and Exact Computation

3. Special Issue of *Theory of Computing Systems* Exact Computation and Parameterized Complexity. Vol 41 No 3 (October 2007).

4. Two special issue of *The Computer Journal* devoted to Parameterized Complexity (with Mike Fellows and Mike Langston). Volume 58 Numbers 1 and 3, 2008, Oxford University Press.

5. Special issue of *Theory of Computing Systems*, Theory of Computing Systems, Vol. 52, Issue 1, 2013, Computability, Complexity and Randomness.

Electronic Article

1. *Algorithmic randomness*, (with Jan Reimann) for *Scholarpedia*, (Rodney G. Downey and Jan Reimann (2007) Algorithmic randomness. Scholarpedia, 2(10):2574) http://www.scholarpedia.org/article/Algorithmic_Randomness

Papers

1. On a question of A. Retzlaff, Z . *Math. Logik Grund. der Math.*, **29** (1983) 379-384.

2. Abstract dependence, recursion theory and the lattice of recursively enumerable filters, *Bull. Aust. Math. Soc.*, **27** (1983) 461-464.

3. Nowhere simplicity in matroids, *J. Aust. Math. Soc. (Series A)* **35** (1983) 28-45.

4. Co-immune subspaces and complementation in V_∞ , *J. Symbolic Logic*, **49** (1984) 528-538.

5. Perfect McLain groups are super-perfect, (with A.J. Berrick), *Bull. Aust. Math. Soc.*, **29** (1984) 249-257.

6. Bases of supermaximal subspaces and Steinitz systems, *J. Symbolic Logic*, **49** (1984) 1146-1159.

7. Decidable subspaces and recursively enumerable subspaces,(with C.J. Ash), *J. Symbolic Logic*, **49** (1984) 1137-1145.

8. Some remarks on a theorem of Iraj Kalantari concerning convexity and recursion theory, *Z. Math. Logik Grund. der Math*, **30** (1984) 295-302.

9. The universal complementation property, (with J.B. Remmel), *J. Symbolic Logic*, **49** (1984) 1125-1136.

10. A note on decomposition of recursively enumerable subspaces,*Z. Math. Logik Grund. der Math.*, **30** (1984) 456-470.

11. Automorphisms of supermaximal subspaces, (with G.R. Hird), *J. Symbolic Logic*, **50** (1985) 1-9.

12. Effective extensions of linear forms in a recursive vector space over a recursive field, (with I.Kalantari), Z. *Math. Logik Grund. der Math.*,**31** (1985) 193-200.

13. The degrees of r.e. sets without the universal splitting property, *Trans. Amer. Math. Soc.*, **291** (1985) 337-351

14. Sound, totally sound, and unsound recurvise equivalence types, *Annals Pure and App. Logic*, **31** (1986) 1-22.

15. Splitting properties of r.e. sets and degrees (with L.V. Welch), *J. Symbolic Logic*, **51** (1986) 88-109.

16. Recursion theory and ordered groups, (with S. Kurtz) *Annals Pure and App. Logic.*, **32** (1986) 137-151.

17. Undecidability of $L(F_\infty)$ and other lattices of r.e. substructures, *Annals Pure and App. Logic*, **32** (1986) 17-26. (Corrigendum in *ibid* 48 (1990) 299-301.)

18. Bases of supermaximal subspaces and Steinitz systems II, *Z. Math. Logik Grund. der Math*, **31** (1986) 203-210.

19. Structural interactions of the recursively enumerable T- and W-degrees, (with M. Stob), *Annals Pure and App. Logic.*, **31** (1986) 205-236.

20. Orbits of creative subspaces, *Proc. Amer. Math Soc.*, **99** (1987) 163-170.

21. Subsets of hypersimple sets, *Pacific J. Math.*, **127** (1987) 299-319.

22. Maximal theories, *Annals Pure and App. Logic.*, **33** (1987) 245-282.

23. Degrees of splittings and bases of an r.e. vector space, (with J.B. Remmel and L.V. Welch), *Trans Amer. Math Soc.*, **302** (1987) 683-714.

24. Localization of a theorem of Ambos-Spies and the strong anti-splitting property.*Archiv. für Math Logik Grundlagenforschung*, **26** (1987) 127-136.

25. Δ_2^0 degrees and transfer theorems, *Illinois J. Math.*, **31** (1987) 419-427.

26. *T*-degrees, jump classes and strong reducibilities, (with C. Jockusch). *Trans. Amer. Math. Soc.*, **301** (1987) 103-136.

27. Automorphisms and recursive structures, (with J.B.Remmel), *Z. Math. Logik Grund. der Math.*, **33** (1987) 339-345.

28. Two theorems on truth table degrees, *Proc. Amer. Math. Soc.*, **103** (1988), 281-287.

29. Recursively enumerable *m*-degrees and *tt*-degrees II : the distribution of singular degrees. *Archive for Mathematical Logic*, **27** (1988), 135-148.

30. Intervals and sublattices in the r.e. weak truth table degrees, Part I : density, *Ann. Pure and Appl. Logic*, **41** (1989) 1-27.

31. Completely mitotic r.e. degrees (with T. Slaman), *Ann. Pure and Appl. Logic*, **41** (1989) 119-153.

32. D-r.e. degrees and the nondiamond theorem. *Bull. London Math. Soc.*, **21** (1989) 43-50.

33. Classification of degree classes associated with r.e. subspaces, (with J.B. Remmel), *Ann. Pure and Appl Logic*, **42** (1989) 105-125

34. Degrees bounding minimal degrees, (with C.T. Chong), *Math.Proc.Cambridge Phil. Soc.*, **105** (1989) 211-222.

35. Honest polynomial reductions, non relativizations and $P =?NP$ (with W. Gasarch, S. Homer and M. Moses) *Proceedings of the 4th Annual Conference on Structures in Complexity Theory*, (1989), IEEE Publ. 196-207.

36. Recursively enumerable m-degrees and tt-degrees I : the quantity of m-degrees. *J. Symb. Logic*, **54** (1989) 553-567

37. On choice sets and strongly nontrivial self-embeddings of recursive linear orders. (with M.F. Moses) *Z. Math. Logik Grundlagen Math.*, **35** (1989) 237-246.

38. Intervals and sublattices in the r.e. weak truth table degrees, Part II : nonbounding, *Ann. Pure and Appl. Logic*, **44** (1989) 153-172

39. On hyper-torre isols, *J. Symbolic Logic*, **54** (1989) 1160-1166

40. A contiguous nonbranching degree, *Z.Math Logic Grundlagen Math.*, **35** (1989) 375-383.

41. On Ramsey-type theorems and their applications, *Singapore Math. Medley*, **17** (1989) 58-78.

42. Lattice nonembeddings and initial segments of the recursively enumerable degrees, *Annals Pure and Appl. Logic*, **49** (1990) 97-119.

43. Automorphism and splittings of recursively enumerable sets, (with M Stob) in *Proceedings of the Forth Asian Logic conference, CSK publication*, Tokyo (1990) 75-87.

44. Array recursive sets and multiple permitting arguments (with M. Stob and C. Jockusch) in *Proceedings Oberwolfach 1989*, Springer Verlag, *Lecture Notes in Mathematics 1990*, 141-174.

45. Notes on the $\mathbf{0}'''$ priority method with special attention to density theorems, in *Proceedings Oberwolfach 1989*, Springer Verlag, *Lecture Notes in Mathematics 1990*, 111-140.

46. Superbranching degrees, (with J. Mourad) in *Proceedings Oberwolfach 1989*, Springer Verlag, *Lecture Notes in Mathematics 1990*, 175-186.

47. Minimal degrees recursive in 1-generic degrees, (with C.T. Chong), *Annals Pure and Appl. Logic*, **48** (1990) 215-225.

48. On complexity theory and honest polynomial time degrees, *Theoretical Computer Science*, **78** (1991) 305-317.

49. Jumps of hemimaximal sets, (with M. Stob), *Z. Math. Logik Grundlagen Math.*, **37** (1991) 113-120.

50. Recursive linear orderings with incomplete successivities (with M.F. Moses), *Trans. Amer. Math.Soc.*, **326** (1991) 653-668.

51. Automorphisms of the lattice of recursively enumerable sets : Orbits (with M. Stob), *Advances in Math.*, **92** (1992) 237-265.

52. Tabular degrees and α-recursion theory, (with C. Bailey), *Annals Pure and Applied Logic*, **55** (1992),205-236.

53. Splitting theorems in recursion theory, (with M. Stob) *Annals Pure and Applied Logic*, **65** (1)((1993) 1-106).

54. Orderings with α-th jump degree $\mathbf{0}^{\alpha}$ (with J.F. Knight), *Proc. Amer. Math. Soc.*, **114** (1992) 545-552.

55. On Π_1^0 classes and their ranked points, *Notre Dame J. of Formal Logic*, **32** (1991) 499-512.

56. An invitation to structural complexity, *New Zealand Journal of Mathematics*, **21** (1992) 33-91.

57. On co-simple isols and their intersection types (with T. Slaman), *Annals pure and Appl. Logic*, (Special issue in honour of John Myhill), **56** (1992) 221-237.

58. Fixed parameter intractability, (with M. Fellows), *Proceedings Structure in Complexity, Seventh Annual Conference, IEEE Publication*, (1992) 36-50.

59. Fixed parameter tractability and completeness, (with M. R. Fellows), *Congressus Numerantium*, **87** (1992) 161-187.

60. Automorphisms of the lattice of recursively enumerable sets: promptly simple sets (with P. Cholak and M. Stob), *Trans. American Math. Society*, **332** (1992) 555-570.

61. Fixed parameter intractability II, (with K. Abrahamson and M. F. Fellows) in *Proceedings Tenth Annual Symposium on Theoretical Aspects of Computer Science* (STACS'93)(Ed. G. Goos and J. Hartmanis), Springer-Verlag Lecture Notes in Computer Science, Vol 665 (1993) 374-385.

62. Parameterized computational feasibility, (with M. Fellows) in *Feasible Mathematics II* (ed. P. Clote and J. Remmel) Birkhauser (1995) 219-244.

63. Nondiamond theorems for polynomial time reducibility, *Journal of Computing and System Sciences*, **45** (1992) 385-395.

64. Computability Theory and Linear Orderings, in *Handbook of Recursive Mathematics* (ed Ershov, Goncharov, Nerode and Remmel) Vol 2, North Holland, (1998), 823-977.

65. Effective algebras and relational systems; coding properties (with J.B. Remmel), in *Handbook of Recursive Mathematics* (ed Ershov, Goncharov, Nerode and Remmel) Vol 2, North Holland, (1998), 977-1041.

66. Friedberg splittings of recursively enumerable sets (with M. Stob), *Annals Pure and Applied Logic*, **59** (1993) 175-199.

67. Degrees of inferability (with P. Cholak, L. Fortnow, W. Gasarch, E. Kinber, M. Kummer, S. Kurtz, and T. Slaman), *Proceedings of Colt '92 (Fifth Annual Workshop on Computational Learning Theory, 1992)*, 180-192.

68. On the Cantor-Bendixon rank of recursively enumerable sets, (with P. Cholak), *J. Symbolic Logic*, **58** (1993) 629-640.

69. Countable thin Π_1^0 classes, (with D. Cenzer, C. Jockusch, and R. Shore), *Annals Pure and Applied Logic*, **59** (1993) 79-139.

70. Array nonrecursive sets and lattice embeddings of the diamond, *Illinois J. Mathematics*, **37** (1993) 349-374.

71. Embedding Lattices into the wtt-degrees below $\mathbf{0}'$, (with C. Haught), *J. Symbolic Logic*, **59** (1994) 1360-1382.

72. Effectively and noneffectively nowhere simple subspaces, (with J.B. Remmel), *Logical Methods* (ed. Crossley, Remmel, Shore, and Sweedler) Birkhauser, Boston, 1994, 314-351.

73. Permutation and presentations (with P. Cholak), *Proc. Amer. Math. Soc.* **122** (1994) 1237-1249.

74. Every recursive boolean algebra is isomorphic to one with incomplete atoms, *Annals Pure and Applied Logic*, **60** (1993) 193-206.

75. Fixed-parameter tractability and completeness II: on completeness for W[1] (with M. Fellows), *Theoretical Comput. Sci.* **141** (1995) 109-131.

76. Recursively enumerable *m*- and *tt*- degrees III: realizing all finite distributive lattices (with P. Cholak), *J. London Math. Soc.*, (2) **50** (1994) 440-453.

77. Fixed-parameter tractability and completeness III: some structural aspec ts of the *W*-hierarchy (with M. Fellows) in *Complexity Theory: Current Research* (Ed. K. Ambos-Spies, S. Homer and U. Schoning) Cambridge University Press, (1993) 166-191.

78. Lattice nonembeddings and intervals in the recursively emumerable degrees, (with P. Cholak), *Annals Pure and Applied Logic*, **61**, (1993), 195-222.

79. Decidability and definability for parameterized polynomial time *m*-reducibilities, (with P. Cholak) *Logical Methods*, (ed. Crossley, Remmel, Shore, and Sweedler) Birkhauser, Boston, 1994, 194-221.

80. On irreducible *m*-degrees, *Rendiconti Seminario Matematico Dell'Universita e Del Politecnico di Torino*, (Rend. Sem. Mat. Univ. Pol. Torino), **51**, (1993) 109-112.

81. Parameterized learning complexity, (with M. Fellows and P. Evans) in *Proceedings of the Sixth Annual Conference on Computational Learning Theory*, ACM Press, New York, (1993) 51-57.

82. The parameterized complexity of some problems in logic and linguistics, (extended abstract) (with M. Fellows, B. Kapron, M. Hallett, and T. Wareham), in *Proceedings of the Workshop on Structural Complexity and Recursion Theoretical Methods in Logic Programming*, October 29, Vancouver, Canada (ed. Blair, H., V. Marek, A. Nerode, J. Remmel) Mathematical Sciences Institute Publ. (1993) 44-58. Final version in *Logic at St. Petersberg* (Ed. A. Nerode and Yu. Matiyasevich) Springer Verlag Lecture Notes in in Computer Science, Vol 813, (1994) 89-101

83. Every low boolean algebra is isomorphic to a recursive one, (with C. Jockusch) *Proceedings Amer. Math. Society*, **122**, No. 3, November 1994, pp. 871-880.

84. Highness and bounding minimal pairs, (with S. Lempp and R. Shore), *Mathematical Logic Quarterly* **39** (1993) 475-491.

85. Fixed-parameter tractability and completeness I: basic results, (with M. Fellows), *SIAM J. Computing* **24** (1995), 873-921.

86. There is no plus-capping degree, (with S. Lempp), *Archive for Mathematical Logic*, **33** (1994) 109-119.

87. Fixed-paramater tractability and completeness IV: on completeness for W[P] and *PSPACE* analogues, (with K. Abrahamson and M. Fellows), *Annals Pure and Applied Logic*, **73**, (1995) 235-276.

88. On the structure of parameterized problems in NP (extended abstract), (with L. Cai, J. Chen and M. Fellows,) in *Proceedings Eleventh Annual Symposium on Theoretical Aspects of Theoretical Computer Science, 1994* (STACS '94) (Ed. E. Mayr and k. Wagner), Springer-Verlag, Lecture Notes in Computer Science, Vol 775, (1994) 509-520. Final Version in *Information and Computation,* Vol 123 (1995) 38-49.

89. A rank one cohesive set, (with Yue Yang), *Annals Pure and Applied Logic*, **68** (1994) 161-171.

90. The parameterized complexity of sequence alignment and consensus, (extended abstract) (with H. Bodlaender, M. Fellows, and H. Todd Wareham), in *Combinatorial Pattern Matching*, (5th Annual Symposium, CPM'94, Asilomar June 1994) (Ed. Maxime Crochemore and Dan Gusfield) Lecture Notes in Computer Science Vol 807 (1994) 15-30.

91. Parameterized Complexity Analysis in Computational Biology, (with H. Bodlaender, M. Fellows, M. Hallett, and H. Todd Wareham), in *IEEE Computer Society Workshop on Shape and Pattern Matching in Computational Biology*, held in conjunction with the 1994 IEEE Conference on Computer Vision and Pattern Recognition, June 1994. Final Version appeared in *Computer Applications in the Biosciences*, **11**, (1995), 49-57

92. The Parameterized Complexity of Short Computation and Factorization, (with L. Cai, J. Chen and M. Fellows), Proceedings of the *Sacks Symposium*, in *Archive for Mathematical Logic,* Vol. 36, No 4/5 (1997), 321-338.

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240. Computability theory, complexity theory, reverse mathematics and algorithmic randomness, in *The Human Face of Computing*, C. Calude, ed., Imperial College Press, Advances in Computer Science and Engineering Texts, Vol. 9, 2015, 203-224.

241. The Finite Intersection Property and Genericity (with Diamondstone, Greenberg and Turetsky), *Mathematical Proceedings of the Cambridge Philosophical Society.* Vol. 160 (02), 2016, 279 - 297

242. Random strings and truth table degrees of Turing complete c.e. sets (with M. Cai, R. Epstein, S. Lempp and J. Miller) *Logical Methods in Computer Science.* 10(3):15, 24 pp., 2014.

243. Minimal pairs in the c.e. truth table degrees, (with Keng Meng Ng) in *Proceedings of the 13th Asian Logic Conference*, ed X. Zhao, Q. Feng, B. Kim and L. Yu) World Scientific 2015, 53-67.

244. Abelian p-groups and the halting problem, (with Melnikov and Ng), *Annals of Pure and Applied Logic.* Vol. 167, (2016), 1123-1138.

245. On Δ_2^0 categoricity of Equivalence Relations, (with Melnikov and Ng), *Annals of Pure and Applied Logic*, (2015), 166(9), pp. 851-880.

246. Generic Muchnik reducibility and presentations of fields, (with N. Greenberg and J. Miller), *Israel Journal of Mathematics.* Vol. 216(1) (2016), 371-387.

247. Myhill-Nerode Methods for Hypergraphs, (with M. Fellows, S. Gaspers, F. Rosamond, R. van Bevern) *Algorithmica* Vol. 73(4):696-729, 2015

248. Any FIP real computes a 1-generic (with Peter Cholak and Greg Igusa), *Transactions of the American Mathematical Society*, Vol. 369 (2017), 5855-5869.

249. Turing and Randomness, in *The Turing Guide* (Ed. Jack Copeland, Johnathan Bowen, Mark Sprevak, and Robin Wilson) Oxford University Press, 2017, 427-436.

250. The members of thin and minimal Π_1^0 classes, their ranks and Turing degree s, (with Y. Yang and G. Wu) Annals of Pure and Applied Logic, Vol. 166 (2015), 741-754.

251. Avoiding effective packing dimension 1 below array noncomputable c.e. degrees (with Jonny Stephenson), *Journal of Symbolic Logic.* Vol. 83 (2018), 717-739.

252. Lowness and Bennett Depth, (with Michael McInerney and Keng Meng Ng), *Theoretical Computer Science A*. Vol. 702 (2017), 23 - 33

253. Multiple recurrence and algorithmic randomness, (with Satyadev Nandakumar and André Nies), accepted *Notre Dame Journal of Formal Logic*.

254. A weakly 2-generic degree which bounds a minimal degree, (with Satyadev Nandakumar), accepted *Journal of Symbolic Logic*.

255. A Friedberg Enumeration of Equivalence Structures, (with Melnikov and Ng) accepted *Journal of Mathematical Logic*.

256. Kobayashi compressibility, (with George Barmpalias), *Theoretical Computer Science A* Vol. 675 (2017) 89-100.

257. A Question of Kalimullin, (with Greg Igusa and Alexander Melnikov) *Proceedings of the American Mathematical Society*. Vol. 146, Number 8, (2018), 3553-3563

258. Degrees containing members of thin classes are dense and co-dense. (with Wu and Yang) accepted, *Journal of Mathematical Logic*.

259. Notes on Computable Analysis, (with Adam Day and Michelle Porter) *Theory of Computing Systems*, 60(1) (2017), 53-111

260. A hierarchy of computably enumerable degrees, (with Noam Greenberg), *Bulletin of Symbolic Logic*, Vol. 24 March (2018), 53 - 89

261. Splitting into degrees with Low Computational Strength, (with Ng), accepted *Annals of Pure and Applied Logic*

262. Maximality and collapse in the Hierarchy of α-c.a. Degrees (with Arthur and Greenberg) submitted, *Notre Dame Journal of Formal Logic*

263. Splitting Theorems and Low Degrees, (with Chih), accepted, *Computability*.

264. On Low for Speed Oracles, (with Laurent Bienvenu), in *35th Symposium on Theoretical Aspects of Computer Science (STACS 2018)*, (2018) 15:1–15:13, Leibniz International Proceedings in Informatics (LIPIcs), (Rolf Niedermeier and Brigitte Vallée), eds.) Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik, Dagstuhl, Germany.

265. On Oracles low for Speed, with Bienvenu, submitted JCSS

266. Algorithmic Randomness, (with Denis Hirschfeldt), accepted, *Communications of the Association for Computing Machinery*.

267. Graphs are not universal for online computability, (with Matthew Harrison-Trainor, Iskander Kalimullin, Alexander Melnikov and Daniel Turetsky).

268. Enumerating abelian p-groups, (with Alexander Melnikov and Keng Meng Ng)

269. Foundations of online model theory I: The Infinite Case, (with Alexander Melnikov and Keng Meng Ng)

270. Categorical Linearly Ordered Structures, with Alexander Melnikov and Keng Meng Ng, submitted. APAL

Papers in preparation

271. Notes on Sacks' Splitting Theorem, with K. Ambos-Spies and M. Monath.

272. Decompositions of c.e. sets and degrees, with Guohua Wu.

273. Lower bounds for the SJT hard sets, (with David Diamondstone, Noam Greenberg and Dan Turetsky)

274. A set low for speed and of minimal degree. (with Bienvenu and Harrison-Trainor)

275. Reducibilities for discontinuous functions. (with Day and Westrick)

276. Index sets and Π^0_1 classes, (with Ng and Csima) being written.

Professional Societies:

I am a member of the following societies American Math. Society (life member), Australian Math. Society, New Zealand Math. Society, European Association for Theoretical Computer Science, London Math. Society, Association for Symbolic Logic, (Council) Combinatorial Mathematics Society of Australasia (life member), Royal Society of New Zealand, Wellington Mathematical Society, The Association for Computing Machinery (life member).

Other Information:

I am a reviewer for Mathematical Reviews, Zentralblatt für Mathematik, and the Journal of Symbolic Logic. For these I have over 300 reviews including 14 book reviews. I am a referee for various journals such as the Journal of Symbolic Logic, Annals of Pure and Applied Logic, the Transactions of the American Math. Society, the Archive for Mathematical Logic, Theoretical Computer Science, Journal of Computer and System Sciences, Journal of Computing and System Sciences, SIAM Journal of Computing, Journal of Graph theory, and the Australasian Journal of Combinatorics. I have been on numerous programme committees for Computer Sceince and logic meetings. I have given numerous invited addresses at international meetings and colloquia.

For instance, here are some recent invited lectures:

- 2002 September Plenary and Keynote (first) speaker, 8th Asian Logic Conference, Chongqing China.

- 2002 July Plenary and closing address to the international meeting at Schloss Dagstuhl on Parameterized Complexity.

- 2002 January Plenary speaker at the Annual meeting of the Association for Symbolic Logic, San Diego.

- 2002 January Keynote speaker for special session on Computability Theory for the American Mathematical Society Winter Meetings, San Diego.

- 2003 August Keynote speaker in the Kolomogorov Centenary meeting in Heidelberg.

- 2003 July Plenary Speaker in the Annual Conference on Computational Complexity, Aarhus, Denmark.

- 2003 September, Plenary speaker at the Conference on Computability and Complexity in Analysis, Cincinnatti, USA.

- 2004 January Plenary Speaker at the international meeting VIC 2004, Wellington, 2004.

- 2004 July Invited Tutorial Speaker (3 lectures) NZIMA Combinatorics Program: Workshop on Combinatorics and its Applications, Auckland

- 2004 August, Plenary Speaker at the Annual Mathematical Foundations of Computer Science, Prague.

- 2004 December Joint Plenary speaker at Automata, Structures and Logic and Developments in Language Theory, Auckland.

- 2005 February Plenary Speaker at the UCLA Meeting for the opening of its Logic Center, sponsored by the ASL, NSF and UCLA.

- 2005 May. Invited speaker at University of Chicago for 4 lectures on algorithmic randomness, whilst Visiting Scholar.

- 2005 July-August. One of the only 2 invited Tutorial Speakers (in computability theory, the second month, the other being Ted Slaman at Berkeley) at the 2 month meeting Computational Prospects of Infinity, Singapore. Five Lectures on Algorithmic Randomness.

- 2005 September Invited Speaker at the 16th Australasian Workshop on Combinatorial Algorithms

- 2006 May. Plenary speaker at Theory and Applications of Models of Computation, Beijing.

- 2006 July. Tutorial Speaker at The European Logic Colloquium, Nijmegen, Holland. Three Lectures.

- 2006 August. Invited 45 minute Speaker, International Congress of Mathematicians, Madrid.

- 2007 August. Invited Lecture, International Congress of Logic Methodology and Philosophy of Science, Beijing.

- 2007 December. Plenary Lecture, First Joint Meeting of the New Zealand Mathematical Society and the American Mathematical Society, Wellington.

- 2008 February, Tutorial speaker, NZIMA Algorithmics Meeting, Napier.

- 2008 March, Invited speaker, American Math. Society Special Session on Computability, Irvine.

- 2008 June, Invited Speaker, Logic Computability and Randomness, Nanjing, China.

- 2008 December, Invited Speaker, special session on algorithmics, NZMS/Aust MS annual Meeting, Christchurch.

- 2009 February, Royal Society Invited Speaker for Rutherford Foundation Dinner, Wellington Town Hall.

- 2009 May, Invited Speaker, Algorithmic Randomness Meeting, Madison.

- 2009 June, Plenary Speaker, Asian Logic Meeting, Singapore.

- 2010 May, Invited Speaker, Midwest Computability Seminar, University of Chicago.

- 2010 May, Plenary Speaker, 5th Logic, Computability and Randomness Conference, University of Notre Dame, USA.

- 2011 February, Plenary Speaker, 6th Computability and Randomness Conference, Cape Town, South Africa.

- 2011 July, Invited Speaker Computational prospects of Infinity II, National University of Singapore.

- 2012 January, Schloss Dagstuhl, Computability and Randomness

- 2012 February, Oberwolfach, Computability

- 2012 March, Tutorial Speaker, Language, Automata Theory and Applications, A Coruna, Spain.

- 2012, April, University of Leicester.

- 2012, April, Tutorial Speaker, British Computer and Theoretical Computer Science, University of Manchester. (London Mathematical Society Discrete Mathematics Keynote Speaker)

- 2012, June, Special Session Speaker, The Incomputable, Chichley Hall.

- 2012, June, Plenary Lecture, How The World Computes-The Turing Centenary Conference, CIE, Cambridge, UK.

- 2012, June, Data Reduction and Problem Kernals, Schloss Dagstuhl.

- 2012, July, plenary speaker, Computability and Randomness, Isaac Newton Institute, UK

- 2012, August, Plenary Speaker, Turing Memorial Programme, Palacio De La Magdalena, Santander, Spain.

- 2012, October, Alan Turing, the Birth of Computers and the Power of Mathematics, Public Lecture, Victoria University.

- 2012, November, Seminar on parameterized complexity, Cornell University.

- 2012, November, Seminar on the Finite Intersection property.

- 2012, November, Harvard/MIT logic seminar. Finite Intersection property.

- 2012, November, Plenary Lecture, Alan Turing Centenary Conference TURING 100, Boston University.

- 2012, December, Plenary Lecture, Midwest Computabilility Seminar, University of Chicago.

- 2013, January, Plenary Lecture: My Mathematical Encounters with Anil Nerode, Lofical Foundations of Computer Science, San Diego.

- 2013, January, Parameterized complexity basics, Joint Meetings special session on incremental and multivariate computation.

- 2013, January, Effective Torsion-Free abelan groups, special session on Effective Mathmatics, Joint meetings, San Diego.

- 2013, April, Effectivity in Abelian Group Theory, Kobe University.

- 2013, May, What have I been thinking about in parameterized Complexity, Shonan Village Conference Center, Japan.

- 2013, May, Alan Turing and Randomness, Workshop on Information Theory and Randomness, invited Lecture, University of Tokyo.

- 2013, May, Integer Valued Randomness, Workshop on Information Theory and Randomness, invited Lecture, University of Tokyo.

- 2013, May, Recent Progress in Multivariate Algorithmics, Colloquium Lecture, University of Auckland.

- 2014, May, Integer Valued Randomness, Invited Lecture, Midwest Computability (Chicago)

- 2014, May, Effectivity in Abelian Group Theory, University of Notre Dame.

- 2014, Courcelle's Theorem for Triangulations, Invited Lecture, Subfactors in Mathematics and Physics, Maui.

- 2015, Alan Turing, Computing, Bletchley, and Mathematics, Public Lecture, February 2015.

- 2015, Courcelle's Theorem for Triangulations, Invited Lecture, TAMC, Sngapore, May.

- 2015, June Courcelle's Theorem for Triangulations, Invited Lecture, Computability, Probability and Logic, Radboud University, Nijmegen.

- 2015, June Computability in Mathematics-Turing's Legacy MATCH Kolloquium Lecture, University of Heidelberg.

- 2015, July, Alan Turing, Computing, Bletchley, and Mathematics, Singapore Public Library, Singapore (Public Lecture).

- 2015, April, The Life of π, CAPT Masters Lecture Singapore

- 2016, April, Parameterized Complexity, Chinese Academy of Sciences Colloquium, and Tsinghua University.

- 2016, June, Logic for Algorithms, University of Montpellier, colloquium lecture

- 2016, June, The Computational Power of Random Strings, Plenary Lecture, Luminy Conference Center, Computability, Complexity and Randomness.

- Graph Colouring as Mathematical Miniature, CAPT Masters tea, Singapore, Feb 2017.

I am also a reviewer for various granting bodies such as the New Zealand-U.S. Cooperative Science Foundation, and the United States National Science Foundation (both in Mathematics and Computer Science), European Research Council, Saudi Arabian Granting Agency, NSERC (Canada), EPSRC, the Irish NSF, South African NSF, and the Chinese NSF.

Form 1987-1996 I edited the New Zealand Mathematical Society publication "Postgraduate Topics in Mathematics and Related Areas".

I have been a member of the Publications Committee of the New Zealand Mathematical Society, the Committee of the Wellington Mathematical Society, was a member of the Board of Governors of Newlands College from 1987-1989, and am currently a member of the Council and the Australasian Committee of the Association for Symbolic Logic. I served on the National Committee for Mathematics of the Royal Society from 1992-1995, and 2000-. In 1991 I was on the organising committee of the New Zealand Association of Mathematics Teachers Biennial Conference. In 2000, I organized the major NZMRI summer meeting in Kaikoura. In 2002, I am co-organizing the NZMRI meeting in New Plymouth. I co-organized the VIC 2004 meeting in Wellington, and 4 conferences on parameterized complexity and exact computation, such as Dagstuhl 2005. I have been on many (>50) conference committees for computer science conferences. I organized the Asian Logic Meeting in Wellington in December 2011. I am co-organizer of Dagstuhl "Computability" in 2017, and earlier ones in Oberwolfach 2012.

In 1997, 2001, 2004 I was on the Marsden Mathematical and Information Sciences panel. I chaired the panel from 2008-2011 Since 1997, I have been on the Royal Society of New Zealand Fellows Committee for Mathematical and Information Sciences, and since 1999 I have have served as the Fellows representative on the New Zealand National Mathematical & Information Sciences Advisory Group.

My name appears in -Marquis "Who's Who in the World", and "Who's Who Aotearoa".