

ACADEMIC CV

NAME: André Nies
BORN: May 30, 1964
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EDUCATIONAL QUALIFICATIONS:

1998 Habilitation, Universität Heidelberg
1992 PhD, Universität Heidelberg, graded summa cum laude.

APPOINTMENTS:

2009 Associate Professor, University of Auckland
2002 Senior Lecturer, University of Auckland
2001 Associate Professor, University of Chicago
1999 Assistant Professor, University of Chicago
1998 On leave of absence, visiting professorships at University of Wisconsin; Universidade Federal da Bahia, Salvador, Brazil; Università degli Studi di Siena
1995 Assistant Professor at the University of Chicago
1995 Visiting Assistant Professor at Cornell University
1994 Visiting Assistant Professor at the University of Wisconsin at Madison
1993 Postdoctoral position at Universität Heidelberg, Germany

EDITOR OF JOURNALS:

2010 Bulletin of Symbolic Logic, 3-year term
2009 Reviews editor for the Bulletin of Symbolic Logic
2009 Annals of Pure and Applied Logic, 3-year term
2009 Archive of Mathematical Logic

OTHER SERVICES:

2010 Staffing Committee for Faculty of Science, Univ. of Auckland
2009 Membership committee of the ASL, chair, second 3-year term
2008 Academic committee, Dept of Computer Science, Univ. of Auckland
2007 Organizing committee of Assoc. Symbolic Logic (ASL) summer meeting, Bern, 2008
2006 Membership committee of the ASL, chair, 3-year term
2005 Organizer of special session at ASL annual meeting, Stanford

AWARDS and FUNDING:

2011	Silver medal in Kurt Gödel Research Prize competition (by Templeton foundation)
2010	Fellow of the Royal Society of New Zealand
2010	Invited to Newton Institute, Cambridge, June-July 2012 (2,000 pounds support)
2010	Best survey paper award by the Association of Symbolic Logic (joint with R. Downey, D. Hirschfeldt, and S. Terwijn)
2009	New Zealand Mathematical Society Research Award
2008	Principal investigator in a full Marsden grant, joint with Bakhadyr Khossainov NZD 415K
2004	Principal investigator in a full Marsden grant, joint with Bakhadyr Khossainov, NZD 300K
2000	Participant in NSF binational grant with Russia
1999	1-month grant for visiting professorship by CNR, Italy
1998	3-year standard NSF grant, USD 60K
1997	Participant in NSF binational grant with New Zealand
1995	3-year standard NSF grant, USD 60K

INVITED LECTURES (45):

2012	WoLLIC 2012, Buenos Aires Conference “The Incomputable”, Newton Institute, Cambridge, UK. CCA 2012, Cambridge, UK Computability, complexity and randomness 2012, Cambridge, UK Symposium in Honor of Prof Ambos-Spies, Heidelberg, Germany
2011	Computability, complexity and randomness 2011, Cape Town. Workshop “Computability and randomness in Paris”, Univ. Paris 7.
2010	International Congress of Mathematicians, Hyderabad, India, logic session New Zealand Mathematical Society Annual Meeting, Dunedin Conference on Mathematical Logic and Set Theory, Chennai, India Mal’cev Meeting, Novosibirsk, Russia, special session (telepresentation)
2009	Annual meeting of the ASL, Notre Dame, USA, keynote address Summer meeting of the ASL, Sofia, Bulgaria, 3-hr plenary lecture series ICALP 2009, Rhodes, Greece, paper accepted Third conference on logic, computability and randomness (CCR), Marseille, 1-hour talk
2008	Second conference on logic, computability and randomness, Nanjing, China 9-hour Tutorial at summer school on algorithmic randomness, UF Gainesville, USA
2007	First conference on logic, computability and randomness, Buenos Aires, Argentina TAMC 07, Shanghai, China, plenary Workshop on effective structures, Dagstuhl, Germany
2006	Workshop on Kolmogorov complexity and applications, Dagstuhl, Germany Workshop on computability and randomness, American Institute of Maths., Palo Alto, USA SEALS, Gainesville, USA, plenary
2005	Computational prospects of Infinity, IMS, National University of Singapore, tutorial ASL summer meeting, Athens, Greece, keynote address 9 th Asian Logic Colloquium, Novosibirsk, Russia, plenary
2004	VIC New Zealand – Israel workshop in Logic, Computability and Applications Computation and randomness, Cordoba, Argentina
2003	Workshop on randomness and computability, Dagstuhl, Germany ASL meeting, Chicago, Special Session

- 2002 AMS Annual conference, special session, San Diego, US
CL 2002, Muenster, Germany
- 2001 Workshop on computability theory, Oberwolfach, Germany
- 2000 ASL meeting in Urbana--Champaign, USA, special session (declined)
- 1999 AMS computability theory workshop, Boulder, USA
11th International Congress of Logic, Methodology and Philosophy of Science, Cracow, Poland
- 1998 XI. Latin American Logic Symposium, Merida, Venezuela.
- 1997 Annual Meeting of the Association for Symbolic Logic, MIT, Boston, USA
Workshop in Recursion Theory and Complexity Theory, Kazan, Russia.
Ninth Annual Albany Group Theory Conference, Rensselaerville, USA
- 1995 Annual Meeting of the Association for Symbolic Logic, Irvine, California
Greater Boston Logic Colloquium, Boston
Logic Colloquium 1995, Haifa, Israel
- 1993 Special Session in Recursion Theory, Joint AMS/DMV Meeting, Heidelberg, Germany

RESEARCH SPECIALTIES:

Summary Statement: active in computability theory, randomness, computable analysis, algebra, automata presentable structures

Research Publications:

Articles, book chapters, and book (64, including 5 journal versions of conference articles)

- (64) Melnikov, A, Nies, A. *K-triviality in Computable metric spaces*. Proc. AMS, in press.
- (63) Greenberg, N., Nies, A. *Benign cost functions and lowness properties*. J. Symb. Logic 76, Issue 1 (2011), 289-312.
- (62) Calude, C., Nies, A., Staiger, L., Stephan, F. *Universal recursively enumerable sets of strings*. Theoretical Computer Science 412 (2011), 2253-2261.
- (61) Nies, A. *Studying randomness through computation*. In: H.Zenil, editor, *Randomness through computation*, World Scientific (2011), 207-223.
- (60) Nies, A. *Computably enumerable sets below random sets*. Ann. Pure Applied Logic, in press.
- (59) Barmpalias, G., Nies, A. *Upper bounds on ideals in the computably enumerable Turing degrees*. Ann. Pure Applied Logic 162 (6) 465-473.
- (58) Barmpalias, G., Miller, J., Nies, A. *Randomness notions and partial relativization*. Israel J. Math, in press.
- (57) Nies, A. *Interactions of computability and randomness*. Proceedings of the International Congress of Mathematicians (S. Ragunathan, ed.) 30-57 (2010).
- (56) Hjorth, G. and Nies, A. *Borel models and Borel theories*. J. Symb. Logic 76 (2011), 461-476.

- (55) Kucera, A. and Nies, A. *Demuth randomness and computational complexity*. Annals of Pure and Applied Logic 162 (2011) 504-513.
- (54) Kjos, Hanssen, B. and Nies, A. and Stephan, F. and Yu, L. *Higher Kurtz randomness*. Ann. Pure Appl. Logic 161 (2010), no. 10, 1280-1290.
- (53) Kjos, Hanssen, B. and Nies, A. *Superhighness*. Notre Dame J. Formal Logic (2009), 445-452
- (52) Nies, A. *Computability and Randomness*. Oxford University Press (2009), xv + 433 pages.
- (51) Figueira, S., Miller, J. and Nies, A. *Indifferent sets*. J. Logic and Computation 19 (2009), no 2, 425-443.
- (50) Nies, A. and Semukhin, P. *Finite automata presentable abelian groups*. Ann. Pure Applied Logic 161 (2009), 458-467.
- (49) Nies, A. and Thomas, R. *FA-presentable groups and rings*. J. Algebra 320 (2008) 569-585.
- (48) Figueira, S., Nies, A., and Stephan, F. *Lowness properties and approximations of the jump*. Annals of Pure and Applied Logic 152 (2008), 51-66. (Conference version: Wollic 2005, Florianopolis, Brazil.)
- (47) Nies, A. *Comparing quasi-finitely axiomatizable and prime groups*. J. Group Theory 10 (2007), 347-361.
- (46) Chong, C., Nies, A. and Yu, L. *Higher randomness notions and their lowness properties*. Israel Journal of Mathematics 166 (2008), 39-60.
- (45) Nies, A. *Describing Groups*. Bull. Symb. Logic 13 no 3 (2007), 305-339.
- (44) Hjorth, G. and Nies, A. *Randomness via effective descriptive set theory*. J. London Math Soc 75 (2), 2007: 495-508.
- (43) Nies, A. *Non-cupping and randomness*. Proc. Amer. Math. Soc. 135 (2007), no. 3, 837--844.
- (42) Downey, R., Nies, A., Weber, R. and Yu, L. *Lowness and Π_2^0 Nullsets*. J. Symb. Logic 71 (2006), 1044-1052.
- (41) Miller, J. and Nies, A. *Randomness and computability: Open questions*. Bull. Symb. Logic. 12 no 3 (2006) 390-410.
- (40) Downey, R., Hirschfeldt, D., Nies, A and Terwijn, S. *Calibrating randomness*. Bull. Symb. Logic. 12 no 3 (2006) 411-491.
- (39) Merkle, W., Miller, J., Nies, A., Reimann, J. and Stephan, F. *Kolmogorov-Loveland randomness and Stochasticity*. Annals of Pure and Applied Logic, 138 (1-3):183-210, 2006.
- (38) Kjos-Hanssen, B., Nies, A. and Stephan, F. *Lowness for the class of Schnorr random sets*. SIAM J. Comput. 35 (2005), no. 3, 647--657.
- (37) Downey, R., Hirschfeldt, D., Miller, J. and Nies, A. *Relativizing Chaitin's halting probability*. Journal of Mathematical Logic, Vol. 5, No. 2 (2005) 167-192.
- (36) Nies, A. *Lowness properties and randomness*. Advances in Mathematics 197, Issue 1 (2005), 274-305.
- (35) Nies, A., Stephan, F. and Terwijn, S. *Randomness, relativization and Turing degrees*. J. Symb. Logic 70 no 2 (2005), 515-535.
- (34) V. Becher, S. Figueira, A. Nies and S. Picchi. *Program Size Complexity for Possibly Infinite Computations*. Notre Dame J. Formal Logic 46,1 no 1 (2005), 51-64.
- (33) Miller, R., Nies, A. and Shore, R. *The AE-Theory of \mathbf{R} is Undecidable*. Trans. Amer. Math. Soc. vol. 356, no. 8 (2004), 3025-3067.
- (32) Morozov, A. and Nies, A. *Finitely generated groups and first-order logic*. J. London Math Soc. 71 no 2 (2005), 545-562.
- (31) Nies, A. *Separating classes of groups by first order sentences*. Intern. J. of Algebra and Computation 13, No 3 (2003), 287-302.

- (30) Nies, A. *Aspects of free groups*. J. Algebra 263 (2003), 119-125.
- (29) Cenzer, D. and Nies, A. *Global properties of the lattice of Π_0^1 -classes*. Proceedings of the AMS 132 (1) (2003), 239-249.
- (28) Downey, R., Hirschfeldt, D. and Nies, A. *Randomness, computability and density*. Siam J. Computing 31 (2002), 1169-1183. Extended abstract in Proc. STACS 2001.
- (27) Nies, A. *A new spectrum of recursive models*. Notre Dame J. Formal Logic 40 (1999), no. 3, 307-314.
- (26) Lempp, S., Nies, A. and Solomon, R. *On the filter of c.e. supersets of an r -maximal set*. Arch. Math Logic 40, No 6 (2001), 415--423.
- (25) Cenzer, D. and Nies, A. *Initial segments of the lattice of classes*. J. Symb. Logic, 66 (2001), 1749--1765.
- (24) Nies, A. *Interpreting N in the computably enumerable weak truth table degrees*. Ann. Pure Appl. Logic 107 (2001), no. 1-3, 35--48.
- (23) Nies, A., and Sorbi, A. *Structural properties and enumeration degrees*. J. Symb. Logic. 65 no. 1 (2000), 285-293.
- (22) Lempp, S. and Nies, A. *Differences of c.e. sets*. Math. Logic Quarterly 46 (2000), 555-56.
- (21) Nies, A. *Effectively dense Boolean algebras and their applications*. Trans. Amer. Math. Soc. 352, no. 11 (2000), 4989-5012.
- (20) Nies, A., and Sorbi, A. *Branching in the enumeration degrees of Σ_0^1 -sets*. Israel J. Math. 110 (1999), 29-59.
- (19) Nies, A. *Model theory of the computably enumerable many--one degrees*. Logic Journal of the IGPL 8 (1999), issue 5.
- (18) Cholak, P. and Nies, A. *Lattices of supersets of r -maximal sets*. Israel J. Math. 113 (1999), 305-322.
- (17) Downey, R. and Nies, A. *Undecidability results for low complexity time classes*. Journal of Computing and Sys. Sci. Vol. 60 (1999), 465-479.
- (16) Nies, A. *Coding methods in computability theory and complexity theory*. Habilitation thesis, Universität Heidelberg, 1998.
- (15) Harrington, L. and Nies, A. *Coding in the lattice of enumerable sets*. Advances in Mathematics 133 (1998), 133-162.
- (14) Calude, C. and Nies, A. *Chaitin Numbers and Strong Reducibilities*. J. Univ. Comp. Sc. 3, (1998), 1162-1166.
- (13) Downey, R., LaForte, G. and Nies, A. *Enumerable sets and quasireducibility*. Annals of Pure and Applied Logic 9 (1998), pp. 1-35.
- (12) Nies, A., Shore, R. and Slaman, T. *Interpretability and Definability in the recursively enumerable Turing degrees*. Proc. London Math. Soc. (3) 77 (1998), 241-291.
- (11) Lempp, S., Nies, A. and Slaman, T. *The AEA-theory of the recursively enumerable Turing degrees is undecidable*. Trans. Amer. Math. Soc. (7) 350 (1998), 2719-2736.
- (10) Khoussainov, B., Nies, A. and Shore, R. *Recursive Models of Theories with Few Models*. Notre Dame Journal of Formal Logic (2) 38 (1997), 165-178
- (9) Nies, A. *Intervals of the lattice of computably enumerable sets and effective boolean algebras*. Bull. London Math. Soc. 29 (1997), 683-692.
- (8) Nies, A. *Undecidable fragments of elementary theories*. Algebra Universalis 35 (1996), 8-33.

- (7) Nies, A. *The last question on recursively enumerable many--one degrees*. Algebra i Logika (5) 33 (1995), 550-563. Translation July 1995.
- (6) Lempp, S. and Nies, A. *Undecidability of the 4-quantifier theory for the recursively enumerable Turing- and wtt- degrees*. J. Symbolic Logic (4) 60 (1995), 1118--1136.
- (5) Nies, A. and Shore, R.. *Interpreting true arithmetic in the theory of the recursively enumerable truth table degrees*. Annals of Pure and Applied Logic (3) 75 (1995), 269-311.
- (4) Nies, A. *Recursively enumerable equivalence relations modulo finite differences*. Mathematical Logic Quarterly 40 (1994), 490-518.
- (3) Ambos-Spies, K. and Nies, A. *Cappable recursively enumerable degrees and Posts program*. Arch. Math. Logic 32 (1992), 51-56.
- (2) Ambos-Spies, K., Nies, A. and Shore, R.. *The theory of the recursively enumerable weak truth-table degrees is undecidable*. J. Symbolic Logic (3) 57 (1992), 864-874.
- (1) Nies, A. *Definability and Undecidability in Recursion Theoretic Semilattices*. Ph.D. thesis, Universität Heidelberg, 1992.

Full conference papers (13)

- (13) Bienvenu, L., Hoelzl, R, Miller, J.S., and Nies, A. *The Denjoy alternative for computable functions*. **STACS 2012**.
- (12) Montalban, A., Nies, A. *Borel Structures: a brief survey*. Proceedings of EMU 2009, in press.
- (11) Bienvenu, L., Merkle, W., and Nies, A. *Solovay functions and K-triviality*. **STACS 2011**, Dortmund.
- (10) Figueira, S., Hirschfeldt, D., Miller, J., Ng, S., and Nies, A. *Counting the changes of random Delta2 sets*. **CiE 2010**.
- (9) Lewis, A., Nies, A. and Sorbi, A. *The First Order Theories of the Medvedev and Muchnik Lattices*. **CiE 2009**.
- (8) Nies, A. *Superhighness and strong jump traceability*, **ICALP 09**, Rhodes, Greece.
- (7) Calude, C., Staiger, L., Nies, A. and Stephan, F. *Universal Recursively Enumerable Sets of Strings*. **DLT 2008**, Kyoto, Japan.
- (6) Hjorth, G., Khoussainov, B., Montalban, and Nies, A. *From automatic structures to Borel structures*. Proceedings of the Twenty-Third Annual IEEE Symposium on Logic in Computer Science (LICS 2008), 431-441.
- (5) Nies, A. *Eliminating concepts*. In Computational prospects of infinity II, Volume 15 of IMS Lecture Notes Series (2008), pp 225-248. World Scientific.
- (4) Downey, R., Greenberg, N., Mihailovic, N., and Nies, A. *Lowness for Computable Machines*. In Computational prospects of infinity II, Volume 15 of IMS Lecture Notes Series (2008), pp. 79-86. World Scientific.
- (3) Nies, A. and Reimann, J. *A lower cone in the wtt degrees of non-integral effective dimension*. In Computational prospects of infinity II, Volume 15 of IMS Lecture Notes Series (2008), pp. 249-260. World Scientific.
- (2) A. Nies. *Reals which compute little*. Proceedings of Logic Colloquium 2002, Chatzidakis, Z, Koepke, P. and Pohlers, W., editors, Lecture Notes in Logic 27 (2002), 261-275.
- (1) Ambos-Spies, K. and Nies, A. *The theory of the polynomial many-one degrees of recursive sets is undecidable*. **STACS 92**, Lecture Notes in Computer Science 577, 209-210.

Extended abstracts

- (4) Downey, R., Hirschfeldt, D., Nies, A. and Stephan, F. *Trivial reals*. Proceedings of the 7th and 8th Asian Logic Conferences, Singapore University Press, 103-131. (2003)
 - (3) B. Khossainov, B., Nies, A., Rubin, S. and Stephan, F. *Automatic Structures: Richness and Limitations*. Proceedings of **LICS 04**, Helsinki. (2004). Journal version to appear in Log. Methods Comput. Sci. 3 (2007), no. 2, 2:2, 18 pp.
 - (2) Merkle, W., Miller, J., Nies, A., Reimann, J. and Stephan, F. *Kolmogorov-Loveland randomness and Stochasticity*. STACS 2005, volume 3404 of Lecture Notes in Comput. Sci., pages 422–433. Springer, Berlin, 2005. Journal version Annals of Pure and Applied Logic. 138 (2006) 183-210.
 - (1) Nies, A. *Interpreting true arithmetic in degree structures*. Kurt Gödel Colloquium 1993, Lecture Notes in Computer Science 713, 255-263.
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TEACHING:

<i>Topics in recursion theory</i>	Heidelberg, 1993; Wisconsin, 1994; Chicago 1996, 2000; Wisconsin, 1998
<i>Introduction to model theory</i>	Cornell University, 1995
<i>Introduction to mathematical logic</i>	The University of Chicago, 1995, 1996, 1997, 1999, 2000
<i>Analysis</i>	The University of Chicago, 1996
<i>Proof theory I,II</i>	The University of Chicago, 1997
<i>Set theory I,II</i>	The University of Chicago, 1997, 1998, 1999, 2000
<i>Discrete mathematics (CS 225)</i>	University of Auckland, 2002-2011
<i>Algorithms (CS 720)</i>	University of Auckland, 2002
<i>Complexity Theory (CS 750)</i>	University of Auckland, 2002-2008, 2010, 2011
<i>Finite Automata (SE 462)</i>	University of Auckland, 2003
<i>Mathematical Logic (Math 315)</i>	University of Auckland, 2004, 2005, 2007, 2008, 2010, 2011
<i>Algorithms and Data Structures (CS 220)</i>	University of Auckland, 2009
<i>Math. Foundations of Computer Science (CS 350)</i>	University of Auckland, 2009, 2010, 2011

SUPERVISION:

PhD:

Santiago Figueira, PhD 2006, co-supervised with V. Becher (U Buenos Aires)
Pavel Semukhin, PhD 2008, co-supervised with B. Khossainov
Jiamou Liu, PhD 2010, co-supervised with B. Khossainov
Alexander Melnikov, current, co-supervised with B. Khossainov

Projects/honor's dissertations

Helen Broome, two projects (Summer 2008/Semester 1, 2009)
Heather Macbeth, honor's project (Semester 1, 2009)
Tania Roblot, honor's dissertation (2009), joint with C. Calude.
Josh Bax, two projects, 2010, 2011.

Postdoc mentoring:

Bjorn Kjos-Hanssen, 2004-7

Selwyn Ng, 2007-9
George Barmpalias, 2006-8

LANGUAGES:

English, German, Portuguese, Spanish.