

Jan Reimann — Curriculum Vitae

Associate Professor
Pennsylvania State University
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EDUCATION

- Dr. rer. nat. (PhD) in Mathematics, University of Heidelberg, Germany 2004
Thesis: *Computability and Fractal Dimension*
(grade: magna cum laude)
- Diploma in Mathematics, University of Heidelberg, Germany 1997
Thesis: *Topologische Spiele und ressourcenbeschränkte Baire-Kategorie*
(grade: sehr gut, 1.2)

AWARDS AND HONORS

- Don Rung Teaching Award 2015
Department of Mathematics, Pennsylvania State University
- Distinguished Teaching Award, Department of Mathematics, UC Berkeley 2009
- Doktorandenkolloquium, German Association for Mathematical Logic and Foundations of the Exact Sciences (DVMLG) 2004
(awarded to the two best German PhD students in Logic each year)

RESEARCH SUPPORT

- TLT Faculty Fellowship, “Learning Math with Jupyter Notebooks” 2020-2022
Pennsylvania State University
- Center for Online Innovation in Learning (COIL), RIG 2016-2018
Pennsylvania State University (\$39,644)
- National Science Foundation Award DMS-1201263 (\$91,693) 2012-2015
“*Computability and Randomness in Dynamical Systems and Fractal Geometry*”
- National Science Foundation Award DMS-0801270 (\$59,095) 2008-2010
“*Randomness in Recursion Theory and Effective Descriptive Set Theory*”

John Templeton Foundation, Grant 13424 (\$100,000) 2008-2010
"Randomness and the Infinite" (with T. Slaman, Berkeley)

PROFESSIONAL EXPERIENCE

Associate Professor, 2017-present
Department of Mathematics, Pennsylvania State University, University Park

Assistant Professor, 2010-2017
Department of Mathematics, Pennsylvania State University, University Park

Morrey Assistant Professor, 2007-2010
Department of Mathematics, University of California, Berkeley

Visiting Assistant Professor, 2006-2007
Department of Mathematics, University of California, Berkeley

Wissenschaftlicher Assistent (Research Assistant, C1), 2004-2007
Institute for Computer Science, University of Heidelberg, Germany

Wissenschaftlicher Mitarbeiter (BAT IIa), 2001-2004
Institute for Mathematics, University of Heidelberg, Germany

Instructor for Statistical Quality Assurance, 1998-2001
Robert Bosch GmbH, Germany

Software developer, 1996-1998
SAP AG Walldorf, Germany,

RESEARCH INTERESTS

Algorithmic Information Theory and Randomness, Computability, Mathematical Logic, Measure Theory and Fractal Geometry, Descriptive Set Theory, Diophantine Approximation, Graph Limits, Ramsey Theory, Applications to Engineering and Seismology

INVITED VISITS: (LONGER THAN ONE MONTH)

Hausdorff Research Institute for Mathematics, Bonn, Germany, 2013
Program on *Universality and Homogeneity*
(visit cancelled for personal reasons)

University of Chicago, Prof. Denis Hirschfeldt and Prof. Robert Soare	2007
National University of Singapore, IMS Program on Computational Prospects of Infinity	2005
University of California, Berkeley, Prof. Theodore A. Slaman	2005
Victoria University of Wellington, Prof. Rod Downey	2003

SELECTED INVITED TALKS

Annual joint meeting of the German and Austrian Mathematical Societies Minisymposium on New Trends in Algorithmic Randomness and Computable Analysis	2021
TLT Symposium, Penn State	2021
South Eastern Logic Symposium 2020, Gainesville, Florida	2020
CMS Winter Meeting, Toronto, ON, Canada Special Session on Computability Theory	2019
Department of Mathematics Colloquium University of San Francisco	2019
AMS Spring Western Sectional Meeting, Hawaii Special Session on Computability, Complexity, and Learning	2019
Joint Mathematics Meetings, Baltimore Special Session on Algorithmic Dimensions and Fractal Geometry Special Session on Definability and Decidability Problems in Number Theory	2019
Workshop on Computability Theory and its Applications, Waterloo, ON, Canada. Plenary Talk.	2018
New England Recursion and Definability Seminar	2018
CUNY Logic Workshop, City University of New York, New York, NY	2018
Department of Mathematics Colloquium, George Washington University	2017
South Eastern Logic Symposium 2017, Gainesville, Florida Plenary Talk	2017

Workshop on “Normal Numbers: Arithmetic, Computational and Probabilistic Aspects”, ESI Vienna	2016
Conference “Reimagining Calculus Education”, Stevens Inst. Tech. Plenary Talk	2016
Department of Mathematics, University of Illinois Chicago Logic Seminar	2016
South Eastern Logic Symposium 2016, Gainesville, Florida Plenary Talk	2016
Central Fall Sectional Meeting, American Mathematical Society, Chicago	2015
UCLA Summer School in Logic	2015
Conference <i>Varieties of Algorithmic Information</i> , Heidelberg, Germany Plenary Talk	2015
IMS National University of Singapore, Singapore Special Program on <i>Sets and Computations</i>	2015
Department of Mathematics Colloquium, University of San Francisco	2015
Penn State Brandywine, Spring Speaker Series	2015
Winter meeting of the Canadian Mathematical Society, Hamilton, ON, Canada Special Session on <i>Computability Theory</i> ,	2014
Department of Mathematics, Gonzaga University, Spokane, Washington	2014
NII-Shonan Meeting on Algorithmic Randomness and Complexity	2014
Mini-Course on Algorithmic Randomness, Shanghai, China BASICS Summer School, Shanghai Jiao-Tong University	2014
Conference on Computability, Complexity, and Randomness (CCR 2014) IMS Singapore, Singapore	2014
Department of Mathematics, Bloomsburg University, Bloomsburg, PA Department of Mathematics Colloquium	2014
Computability Theory and Foundations of Mathematics (CTFM) 2014, Tokyo, Japan, Plenary Talk	2014
University of California at Berkeley, Berkeley, California Berkeley Logic Colloquium	2014
Joint Mathematics Meetings, Baltimore, MD Special Session on <i>Logic and Probability</i>	2014

Department of Mathematics, University of Florida, Gainesville, FL Departmental Colloquium and Logic Seminar	2013
AMS Fall Central Sectional Meeting, Washington University, St. Louis, MO Special Session on <i>Computability across Mathematics</i>	2013
Conference on <i>Computability, Complexity, and Randomness</i> (CCR) Moscow, Russia, Plenary Talk (cancelled due to illness in family)	2013
UCLA Summer School in Logic (cancelled due to illness in family)	2013
Department of Mathematics, Rutgers University Logic Seminar	2013
University of Connecticut, Storrs, CT Logic Group Seminar	2012
AMS 2012 Spring Eastern Sectional Meeting, George Washington University Special Session on <i>Computable Mathematics</i>	2012
Mid-Atlantic Mathematical Logic Seminar (MAMLS), CUNY, New York, NY	2012
Workshop on Recursion Theory, IMS National University of Singapore	2011
Logic Colloquium 2011, Barcelona, Spain Plenary Talk	2011
AMS Fall Central Section Meeting, University of Notre Dame, South Bend, IN Special Session on <i>Computability and its Applications</i>	2010
Colloquium Logicum 2010, Münster, Germany Plenary Talk	2010
Logic Seminar, Caltech/UCLA	2010
5th Conference on Logic, Computability and Randomness, University of Notre Dame, South Bend, IN Plenary Talk	2010
14th South Eastern Logic Symposium (SEALS), Gainesville, Florida Plenary Talk	2010
MIT Logic Seminar, Cambridge, MA	2010
Workshop on Computability Theory 2010, Ponta Delgada, Azores	2010
14th South Eastern Logic Symposium (SEALS), Gainesville, Florida Plenary Talk	2010

Association for Symbolic Logic Annual Meeting, University of Notre Dame Special Session on <i>Computability Theory</i>	2009
Logic Colloquium, University of Wisconsin, Madison	2009
Logic Seminar, Department of Mathematics, National University of Singapore	2008
Mini-Course on Randomness in Logic, Hamburg, Germany European Summer School in Logic, Language and Information (ESSLLI)	2008
Conference on <i>Computability, Complexity, and Randomness</i> , Nanjing, China Plenary Talk	2008
Department of Mathematics Colloquium, University of Hawaii, Manoa	2008
Association for Symbolic Logic Winter Meeting, San Diego Plenary Talk	2008
Conference <i>VIG</i> 2008, UCLA, Los Angeles Plenary Talk	2008
Joint Meeting AMS and NZMS, Wellington, New Zealand Special Session on <i>Computability Theory</i>	2007
Conference on <i>Logic, Randomness, and Computability</i> , Buenos Aires, Argentina	2007
UCLA Logic Colloquium, Los Angeles	2007
Logic Seminar, Department of Mathematics, University of Chicago	2006
Logic Seminar, Department of Mathematics, University of Notre Dame	2006
<i>Logic Colloquium 2006</i> , Nijmegen, The Netherlands Special Session on <i>Computability Theory</i>	2006
Conference <i>Theory and Applications of Models of Computation</i> , Beijing, China Session on <i>Computability</i>	2006
Logic Colloquium, Department of Mathematics, UC Berkeley	2006
Logic Seminar, Department of Mathematics, National University of Singapore	2005
Workshop on <i>Computational Prospects of Infinity</i> , IMS Singapore	2005
Association for Symbolic Logic Annual Meeting, Stanford University Special Session on <i>Computability and Randomness</i>	2005
Department of Computer Science Colloquium, University of Halle, Germany	2005
Conference on <i>Logic, Randomness, and Computability</i> , Cordoba, Argentina Plenary Talk	2004

<i>Colloquium Logicum</i> , Heidelberg, Germany	2004
School of Mathematics and Computer Science Colloquium Victoria University of Wellington, New Zealand	2004
Max-Planck-Institut für Mathematik, Bonn, Germany	2004
Conference on <i>Computability and Logic</i> , Heidelberg, Germany	2003

CONTRIBUTED TALKS

C. Freer and J. Reimann, The topology of universal graphons <i>Computability and Complexity in Analysis 2015</i> .	2015
B. Kjos-Hanssen and J. Reimann. The strength of the Besicovitch-Davies Theorem. <i>Computability in Europe (CiE) 2010</i> , Ponta Delgada, Azores Accepted Papers Sessions	2010
R. G. Downey, W. Merkle, and J. Reimann. Schnorr dimension. <i>Conference on Computability in Europe 2005</i> Accepted Papers Sessions	2005
W. Merkle, J. Miller, A. Nies, J. Reimann, and F. Stephan. Kolmogorov-Loveland randomness and stochasticity. <i>STACS 2005</i> , Accepted Papers Sessions	2005
K. Ambos-Spies, W. Merkle, J. Reimann, and F. Stephan. Hausdorff dimension in exponential time. <i>16th Annual IEEE Conference on Computational Complexity</i> Accepted Papers Sessions	2001
K. Ambos-Spies, W. Merkle, J. Reimann, S. A. Terwijn. Almost complete sets. <i>STACS 2000</i> , Accepted Papers Sessions	2000

BOOKS

M. Katz and J. Reimann. *An introduction to Ramsey theory*. American Mathematical Society, 2018.

PEER-REVIEWED PUBLICATIONS IN JOURNALS AND VOLUMES

J. Reimann. Information vs. dimension: An algorithmic perspective. *Structure and Randomness in Computability and Set Theory*, pages 111–151, World Scientific, 2021.

J. Reimann and T. A. Slaman. Effective randomness for continuous measures. *J. Amer. Math. Soc.*, 35(2):467–512, 2022.

D. K. Jha, A. Ray, J. Reimann, A. Srivastav, and N. Virani. Symbolic analysis-based reduced order Markov modeling of time series data. *Signal Processing* 149:68–81, 2018.

V. Becher, J. Reimann, and T. A. Slaman. Irrationality exponent, Hausdorff dimension and effectivization. *Monatshefte für Mathematik* 185(2):167–188, 2018.

J. Reimann and T. A. Slaman. Measures and their random reals. *Transactions of the AMS* 367(7): 5081–5097, 2015.

A. Day and J. Reimann, Independence, relative randomness and PA degrees. *Notre Dame Journal of Formal Logic* 55(1):1–10, 2014.

B. Kjos-Hanssen and J. Reimann. The strength of the Besicovitch-Davies Theorem. *Computability in Europe 2010*, Lecture Notes in Computer Science, pp. 229–238, Berlin, 2010. Springer.

J. Reimann. Randomness beyond Lebesgue measure. *Logic Colloquium 2006*, Cambridge University Press, 2009.

J. Reimann. Effectively closed classes of measures and randomness. *Annals of Pure and Applied Logic* 156(1), pp 170–182, 2008.

A. Nies and J. Reimann. A lower cone in the wtt degrees of non-integral effective dimension. *Computational prospects of infinity*, Part II. Institute for Mathematical Sciences, National University of Singapore, 15. World Scientific Publishing, 2008.

R. G. Downey, W. Merkle, and J. Reimann. Schnorr dimension. *Mathematical Structures in Computer Science* 16(5), pp 789-811, 2006.

(An earlier version appeared in: S. B. Cooper, B. Löwe, and L. Torenvliet, editors, *New Computational Paradigms, First Conference on Computability in Europe*, number 3526 in Lecture Notes in Computer Science., pp. 96–105, Berlin, 2005. Springer.)

J. Reimann and F. Stephan. On hierarchies of randomness tests. In *Mathematical Logic in Asia*, Proceedings of the 9th Asian Logic Conference, Novosibirsk, pp. 215-232, World Scientific Publishing, 2006.

W. Merkle, J. Reimann. Selection functions that do not preserve normality. *Theory of Computing Systems*, 39(5):685-697, 2006.

(An earlier version appeared in: *Mathematical foundations of computer science 2003*, volume 2747 of *Lecture Notes in Computer Science*, pages 602–611. Springer, Berlin, 2003.)

W. Merkle, J. Miller, A. Nies, J. Reimann, and F. Stephan. Kolmogorov-Loveland randomness and stochasticity. *Annals of Pure and Applied Logic*, 138(1–3):183–210, 2005.

(An earlier version appeared in: *STACS 2005*, volume 3404 of *Lecture Notes in Computer Science*, pp. 422–433. Springer, Berlin, 2005.)

J. Reimann and F. Stephan. Effective Hausdorff dimension. In *Logic Colloquium '01*, volume 20 of *Lecture Notes Log.*, pp. 369–385. Assoc. Symbol. Logic, Urbana, IL, 2005.

J. Reimann. *Computability and fractal dimension*. Doctoral dissertation, Universität Heidelberg, 2005.

K. Ambos-Spies, W. Merkle, J. Reimann, and S. A. Terwijn. Almost complete sets. *Theoretical Computer Science*, 306(1-3):177–194, 2003.

(An earlier version appeared in: *STACS 2000 (Lille)*, volume 1770 of *Lecture Notes in Computer Science*, pp. 419–430, Berlin, 2000. Springer.)

K. Ambos-Spies, W. Merkle, J. Reimann, and F. Stephan. Hausdorff dimension in exponential time. In *Proceedings of the 16th Annual IEEE Conference on Computational Complexity*, pp. 210–217. IEEE Computer Society, 2001.

K. Ambos-Spies and J. Reimann. Effective Baire category concepts. In *Proceedings of the Sixth Asian Logic Conference (Beijing, 1996)*, pp. 13–29, River Edge, NJ, 1998. World Sci. Publishing.

J. Reimann. Topologische Spiele und ressourcenbeschränkte Baire-Kategorie. Diploma Thesis, Universität Heidelberg, 1997.

ARTICLES SUBMITTED

M. Li and J. Reimann. Turing Degrees and Randomness for Continuous Measures. Submitted to *Archive for Mathematical Logic*.

OTHER PUBLICATIONS

J. Reimann, *Descriptive Set Theory*, electronic book.
[https://28left.github.io/descriptive set theory](https://28left.github.io/descriptive-set-theory)

B. Kjos-Hanssen and J. Reimann, Finding subsets of positive measure.
<http://arxiv.org/abs/1408.1999>

R. Downey and J. Reimann. *Algorithmic Randomness*. Scholarpedia, 2(10):2574.
(invited and peer-reviewed)

TEACHING

Pennsylvania State University, University Park:

Fall 2022	Math 110 – Techniques of Calculus (online, PSU World Campus)
Spring 2022	Math 561 – Set Theory
Spring 2021	Math 557 – Mathematical Logic
Fall 2020	Math 110 – Techniques of Calculus (online, PSU World Campus)
Summer 2020	Math 110 – Techniques of Calculus (online, PSU World Campus)
Spring 2020	Math 110 – Techniques of Calculus (online, PSU World Campus)
Fall 2019	Math 110 – Techniques of Calculus (online, PSU World Campus)
Spring 2018	Math 457 – Introduction to Mathematical Logic
Fall 2017	Math 557 – Mathematical Logic
Summer 2017	Math 140 – Calculus I (online)
Fall 2016	Math 110 – Techniques of Calculus (online, PSU World Campus) Math 574 – Topics in Logic
Summer 2016	Math 110 – Techniques of Calculus (online, PSU World Campus)
Fall 2014	Math 110 – Techniques of Calculus (online, PSU World Campus)
Summer 2014	Math 110 – Techniques of Calculus (online, PSU World Campus)
Spring 2014	Math 110 – Techniques of Calculus (online, PSU World Campus) Math 574 – Topics in Logic
Fall 2012	Math 441 – Matrix Algebra Math 558 – Foundations of Mathematics
Spring 2012	Math 561 – Set Theory
Fall 2011	MASS Course – Introduction to Ramsey Theory The <i>Mathematics Advanced Study Semesters</i> (MASS) program at Penn State brings together talented and motivated undergraduate students from the US and beyond to provide

advanced learning combined with research initiation.
See also massramsey2011.wordpress.com

Spring 2011 Math 574 – Topics in Logic
Fall 2010 Math 435 – Basic Abstract Algebra

University of California, Berkeley

Spring 2010 Math 135 – Incompleteness and Undecidability
Fall 2009 Math 227A – Theory of Recursive Functions
 Math 125A – Mathematical Logic
Spring 2009 Math 225B – Metamathematics
Fall 2008 Math 104 – Introduction to Analysis
 Math 125A – Mathematical Logic
Spring 2008 Math 104 – Introduction to Analysis
Fall 2007 Math 104 – Introduction to Analysis
 Math 110 – Linear Algebra
Spring 2007 Math 185 – Introduction to Complex Analysis
Fall 2006 Math 104 – Introduction to Analysis

INDIVIDUAL SUPERVISION AND MENTORING

Supervision of PhD students:

- Emma Gruner (in progress)
- Kenneth Gill (in progress)
- Mingyang Li (PhD August 2020, Thesis: *Algorithmic randomness and complexity for continuous measures*)
- John Pardo (PhD August 2017, Thesis: *Randomness of restricted value martingales, selection rules, and graph sequences*)

From 2010-2013, I co-supervised graduate students Phil Hudelson and Noopur Pathak.

Moreover, I supervised and am currently supervising several master's theses, undergraduate research projects and honors theses, as listed below.

January 2021-present	Jack Piazza, honors thesis
Jan. 2020 – May 2021	Qixiao Zhong, honors thesis
August 2017 – July 2018	Sean Cotner, honors thesis topic: <i>Diophantine approximation and complexity measures</i>
August 2015 – present	Master's papers by Duane Graysay, Devesh Jha, Samuel Aney, Mohamed Nafea, Sudeepta Mondal
Jan. 2015 – May 2016	Patrick Nicodemus, honors thesis Topic: <i>Computability of graph limits</i>
June 2014 – Dec. 2015	Ryan Wasson, master's thesis Topic: <i>Data compression and fractal dimension</i>
July 2013 – May 2015	Xingyu Zhang, honors thesis Topic: <i>Ramsey Theory and graph metrics,</i>
Fall 2013	Yikun Zhou, Topic: <i>Compression-based estimators for fractal dimensions</i>
July 2011 – May 2012	Qiyuan Li, honors thesis Topic: <i>Fractal Geometry and Algorithmic Information Theory</i>

At the University of California, Berkeley, I supervised the following independent studies and seminars.

Fall 2009	Math 299 – Reading Course for Graduate Students Topic: <i>Recent papers on algorithmic randomness</i>
Spring 2009	Math 196 – Honors Thesis (Alexander Kudlick) Topic: <i>Maharam's Problem</i> Math 199 – Independent Study and Research (Sarah Brodsky) Topic: <i>Measure Theory</i>
Fall 2008	Math 199 – Independent Study and Research Topic: <i>Compactness and Ultrafilters</i>
Spring 2007	Math 24 – Freshmen Seminar Topic: <i>Randomness</i>

At the University of Heidelberg, I supervised two Diploma theses (comparable to a master's thesis)

Theresa Fahrenberger (completed 2004)
Heiner Violet (completed 2005)

PROFESSIONAL MEMBERSHIPS

American Mathematical Society

Association for Symbolic Logic

Deutsche Vereinigung für Mathematische Logik und für Grundlagenforschung
in den exakten Wissenschaften (DVMLG)

PROFESSIONAL ACTIVITIES AND SERVICE

Penn State Graduate Council, *Chair-Elect*, 2022-present

Referee for the following journals:

Advances in Mathematics

American Mathematical Monthly

Annals of Pure and Applied Logic

Archive for Mathematical Logic

Bulletin of Symbolic Logic

Canadian Journal of Mathematics

Experimental Mathematics

Information and Computation

Information Processing Letters

Journal of Complexity

Journal of Logic and Analysis

Journal of Logic and Computation

Journal of Symbolic Logic

Logical Methods in Computer Science

Notre Dame Journal of Formal Logic

Mathematical Logic Quarterly

MathSciNet

Proceedings of the London Mathematical Society

Theoretical Computer Science

Theory of Computing Systems

Transactions on Computation Theory

Scientific Program Committee for the following conferences:

Winter meeting of the Association for Symbolic Logic, San Diego, CA, 2018 (chair)

Annual meeting of the Association for Symbolic Logic, Waterloo, Canada, 2013

Annual meeting of the Association for Symbolic Logic, Madison, WI, 2012
Computability, Complexity, and Randomness 2011, Cape Town, South Africa

Organizing Committee for the following conferences:

Colloquium Logicum, Heidelberg, 2004 *Computability and Logic, Heidelberg, 2003*
Computability and Randomness, Heidelberg, 2003
Computability and Models, Heidelberg, 2001

Co-organizer, AIM workshop on *Algorithmic Randomness, 2020*

Co-organizer of a special session on *Computability, Annual meeting of the Association for Symbolic Logic, Madison, WI, 2012*

Chair, Association for Symbolic Logic Committee on Translations,
January 2016 – December 2019

Installation and administration of WebWork, an open source online homework system (see <http://webwork.maa.org>), for the Department of Mathematics at Penn State, Fall 2013 – present.

Pilot project on Gradarius, an online step-by-step problem solving platform for Calculus instruction (see <http://gradarius.com>), Summer 2016 - present.