Jan Reimann — Curriculum Vitae

Associate Professor email: jan.reimann@psu.edu  
Pennsylvania State University [http://www.personal.psu.edu/jsr25](http://www.personal.psu.edu/jsr25/)  
Department of Mathematics   
322 McAllister Bldg   
University Park, PA 16802

# 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 resourcenbeschränkte 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 2004   
Foundations of the Exact Sciences (DVMLG)   
(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, 2007  
 Prof. Denis Hirschfeldt and Prof. Robert Soare

National University of Singapore, 2005  
IMS Program on Computational Prospects of Infinity

University of California, Berkeley, 2005  
 Prof. Theodore A. Slaman

Victoria University of Wellington, 2003  
 Prof. Rod Downey

# Selected Invited Talks

Annual joint meeting of the German and Austrian Mathematical Societies 2021  
Minisymposium on New Trends in Algorithmic Randomness   
and Computable Analysis

TLT Symposium, Penn State 2021

South Eastern Logic Symposium 2020, Gainesville, Florida 2020

CMS Winter Meeting, Toronto, ON, Canada 2019  
Special Session on Computability Theory

Department of Mathematics Colloquium 2019  
University of San Francisco

AMS Spring Western Sectional Meeting, Hawaii 2019  
Special Session on Computability, Complexity, and Learning

Joint Mathematics Meetings, Baltimore 2019  
Special Session on Algorithmic Dimensions and Fractal Geometry   
Special Session on Definability and Decidability Problems in Number Theory

Workshop on Computability Theory and its Applications, 2018  
Waterloo, ON, Canada. Plenary Talk.

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 2017  
Plenary Talk

Workshop on “Normal Numbers: Arithmetic, Computational 2016 and Probabilistic Aspects”, ESI Vienna

Conference “Reimagining Calculus Education”, Stevens Inst. Tech. 2016  
 Plenary Talk

Department of Mathematics, University of Illinois Chicago 2016  
 Logic Seminar

South Eastern Logic Symposium 2016, Gainesville, Florida 2016  
 Plenary Talk

Central Fall Sectional Meeting, American Mathematical Society, Chicago 2015

UCLA Summer School in Logic 2015

Conference *Varieties of Algorithmic Information,* Heidelberg, Germany2015  
 Plenary Talk

IMS National University of Singapore, Singapore 2015  
 Special Program on *Sets and Computations*

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 2014  
 Special Session on *Computability Theory*,

Department of Mathematics, Gonzaga University, Spokane, Washington 2014

NII-Shonan Meeting on Algorithmic Randomness and Complexity 2014

Mini-Course on Algorithmic Randomness, Shanghai, China 2014  
 BASICS Summer School, Shanghai Jiao-Tong University

Conference on Computability, Complexity, and Randomness (CCR 2014) 2014   
 IMS Singapore, Singapore

Department of Mathematics, Bloomsburg University, Bloomsburg, PA 2014  
 Department of Mathematics Colloquium

Computability Theory and Foundations of Mathematics (CTFM) 2014, 2014  
 Tokyo, Japan, Plenary Talk

University of California at Berkeley, Berkeley, California 2014  
 Berkeley Logic Colloquium

Joint Mathematics Meetings, Baltimore, MD 2014  
 Special Session on *Logic and Probability*

Department of Mathematics, University of Florida, Gainesville, FL 2013  
 Departmental Colloquium and Logic Seminar

AMS Fall Central Sectional Meeting, Washington University, St. Louis, MO2013  
 Special Session on *Computability across Mathematics*

Conference on *Computability, Complexity, and Randomness* (CCR) 2013  
Moscow, Russia, Plenary Talk (cancelled due to illness in family)

UCLA Summer School in Logic 2013  
 (cancelled due to illness in family)

Department of Mathematics, Rutgers University 2013  
 Logic Seminar

University of Connecticut, Storrs, CT 2012   
 Logic Group Seminar

AMS 2012 Spring Eastern Sectional Meeting, George Washington University 2012  
 Special Session on *Computable Mathematics*

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 2011  
 Plenary Talk

AMS Fall Central Section Meeting, University of Notre Dame, South Bend, IN 2010  
 Special Session on *Computability and its Applications*

Colloquium Logicum 2010, Münster, Germany 2010  
 Plenary Talk

Logic Seminar, Caltech/UCLA 2010

5th Conference on Logic, Computability and Randomness, 2010  
 University of Notre Dame, South Bend, IN  
 Plenary Talk

14th South Eastern Logic Symposium (SEALS), Gainesville, Florida 2010  
 Plenary Talk

MIT Logic Seminar, Cambridge, MA 2010

Workshop on Computability Theory 2010, Ponta Delgada, Azores 2010

14th South Eastern Logic Symposium (SEALS), Gainesville, Florida  2010  
 Plenary Talk

Association for Symbolic Logic Annual Meeting, University of Notre Dame 2009  
 Special Session on *Computability Theory*

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 2008  
  European Summer School in Logic, Language and Information (ESSLLI)

Conference on *Computability, Complexity, and Randomness*, Nanjing, China 2008  
 Plenary Talk

Department of Mathematics Colloquium, University of Hawaii, Manoa 2008

Association for Symbolic Logic Winter Meeting, San Diego 2008  
 Plenary Talk

Conference *VIG* 2008, UCLA, Los Angeles 2008  
 Plenary Talk

Joint Meeting AMS and NZMS, Wellington, New Zealand 2007  
 Special Session on *Computability Theory*

Conference on *Logic, Randomness, and Computability*, 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

*Logic Colloquium 2006*, Nijmegen, The Netherlands 2006  
 Special Session on *Computability Theory*

Conference *Theory and Applications of Models of Computation*, Beijing, China 2006  
Session on *Computability*

Logic Colloquium, Department of Mathematics, UC Berkeley 2006

Logic Seminar, Department of Mathematics, National University of Singapore 2005

Workshop on *Computational Prospects of Infinity*, IMS Singapore 2005

Association for Symbolic Logic Annual Meeting, Stanford University 2005  
 Special Session on *Computability and Randomness*

Department of Computer Science Colloquium, University of Halle, Germany 2005

Conference on *Logic, Randomness, and Computability*, Cordoba, Argentina 2004  
 Plenary Talk

*Colloquium Logicum*, Heidelberg, Germany 2004

School of Mathematics and Computer Science Colloquium 2004  
Victoria University of Wellington, New Zealand

Max-Planck-Institut für Mathematik, Bonn, Germany 2004

Conference on *Computability and Logic*, Heidelberg, Germany 2003

# Contributed Talks

C. Freer and J. Reimann, The topology of universal graphons 2015  
*Computability and Complexity in Analysis 2015*.

B. Kjos-Hanssen and J. Reimann. The strength of the Besicovitch-Davies Theorem.   
*Computability in Europe* (CiE) 2010, Ponta Delgada, Azores 2010  
 Accepted Papers Sessions

R. G. Downey, W. Merkle, and J. Reimann. Schnorr dimension. 2005  
*Conference on Computability in Europe 2005*Accepted Papers Sessions

W. Merkle, J. Miller, A. Nies, J. Reimann, and F. Stephan. Kolmogorov-Loveland randomness and stochasticity. 2005  
 *STACS 2005*, Accepted Papers Sessions

K. Ambos-Spies, W. Merkle, J. Reimann, and F. Stephan. Hausdorff dimension in exponential time. 2001  
 *16th Annual IEEE Conference on Computational Complexity* Accepted Papers Sessions

K. Ambos-Spies, W. Merkle, J. Reimann, S. A. Terwijn. Almost complete sets. 2000  
 *STACS 2000*,Accepted Papers Sessions

# 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 resourcenbeschränkte 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>

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 Thoery

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 *Mathematics Advanced Study Semesters* (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: *Diophantine approximation and complexity measures*  
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: *Computability of graph limits*  
June 2014 – Dec. 2015 Ryan Wasson, master’s thesis   
 Topic: *Data compression and fractal dimension*   
July 2013 – May 2015 Xingyu Zhang, honors thesis  
 Topic: *Ramsey Theory and graph metrics,*  
Fall 2013Yikun Zhou,  
 Topic: *Compression-based estimators for fractal dimensions*  
July 2011 – May 2012 Qiyuan Li, honors thesis  
 Topic: *Fractal Geometry and Algorithmic Information   
 Theory*

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

Fall 2009 Math 299 – Reading Course for Graduate Students   
 Topic: *Recent papers on algorithmic randomness*

Spring 2009 Math 196 – Honors Thesis (Alexander Kudlick)  
 Topic: *Maharam’s Problem*  
Math 199 – Independent Study and Research (Sarah Brodsky) Topic: *Measure Theory*

Fall 2008 Math 199 – Independent Study and Research  
Topic: *Compactness and Ultrafilters*

Spring 2007 Math 24 – Freshmen Seminar   
 Topic: *Randomness*

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.