

Jason M. Rute

CONTACT INFORMATION

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RESEARCH INTERESTS

Mathematical logic, primarily computability theory and proof theory:
algorithmic randomness, computable analysis, reverse mathematics, and metastability.

Applications of logic to analysis, primarily probability and measure theory:
ergodic theory, potential theory, martingales, graph limits and stochastic calculus.

EDUCATION

Carnegie Mellon University, Pittsburgh, PA USA *Dept of Mathematical Sciences*

Ph.D., Mathematical Sciences, August 2013

- Thesis: Topics in algorithmic randomness and computable analysis
- Advisor: Professor Jeremy Avigad

M.S., Mathematical Sciences, December 2010

University of Wisconsin, Madison, WI USA

B.S., Mechanical Engineering, December 2004

- Additional major in Mathematics
- Additional major in Philosophy

APPOINTMENTS

Pennsylvania State University, University Park, PA, USA *Mathematics Department*

Research Associate, August 2013 to Present

University of Hawai'i, Manoa, HI, USA

Department of Mathematics

Junior Researcher, February 2013 to July 2013

PUBLISHED PAPERS

1. J. Avigad, E. Dean, J. Rute. Algorithmic randomness, reverse mathematics, and the dominated convergence theorem. *Annals of Pure and Applied Logic*, 163(12):1854–1864, 2012. (11 pages.) [doi:10.1016/j.apal.2012.05.010](https://doi.org/10.1016/j.apal.2012.05.010). [arXiv:1106.0775](https://arxiv.org/abs/1106.0775).
2. J. Avigad, E. Dean, J. Rute. A metastable dominated convergence theorem. *Journal of Logic and Analysis*, 4:3:1–19, 2012. (19 pages.) [doi:10.4115/jla.2012.4.3](https://doi.org/10.4115/jla.2012.4.3).
3. K. Miyabe, J. Rute. Van Lambalgen's Theorem for uniformly relative Schnorr and computable randomness. *Proceedings of the 12th Asian Logic Conference*, 251–270, 2013. (20 pages.) dx.doi.org/10.1142/9789814449274_0014. [arXiv:1209.5478](https://arxiv.org/abs/1209.5478).
4. B. Kjos-Hanssen, P. K. L. Nguyen, J. Rute. Algorithmic randomness for Doob's martingale convergence theorem in continuous time. *Logical Methods in Computer Science*, 10(4:12):1-35, 2014. (35 pages.) [doi:10.2168/LMCS-10\(4:12\)2014](https://doi.org/10.2168/LMCS-10(4:12)2014).
5. J. Avigad, J. Rute. Oscillation and the mean ergodic theorem for uniformly convex Banach spaces. *Ergodic Theory and Dynamical Systems*, 35:4:1009–1027, 2015. (19 pages.) dx.doi.org/10.1017/etds.2013.90. [arXiv:1203.4124](https://arxiv.org/abs/1203.4124).

ACCEPTED
PAPERS

6. J. Rute. Computable randomness and betting for computable probability spaces. *Mathematical Logic Quarterly*, to appear. (43 pages.) [arXiv:1203.5535](#).
7. J. Rute. When does randomness come from randomness? *Theoretical Computer Science*, available online, 2016. (22 pages.) [dx.doi.org/10.1016/j.tcs.2016.05.001](#).
[arXiv:1508.0508](#).

SUBMITTED
PAPERS

8. J. S. Miller, J. Rute. Energy randomness. (19 pages.) [arXiv:1509.00524](#).
9. J. N. Y. Franklin, T. H. McNicholl, J. Rute. Algorithmic randomness and Fourier analysis. (18 pages.) [arXiv:1603.01778](#).

SELECTED
TALKS

- Computing uniform (metastable) rates of convergence from the statement of the theorem alone. New England Recursion and Definability Seminar, Worcester MA USA. October 2015.
- (Invited) Application of computable continuous model theory to a question in proof theory. AMS Sectional Meeting, Special Session on Computability Theory and Applications, Chicago USA. October 2015.
- Randomness for ergodic measures. Computability in Europe, Bucharest Romania. July 2015.
- (Invited) New directions in randomness. Computability, Complexity, and Randomness, Heidelberg Germany. June 2015.
- Algorithmic randomness and constructive/computable analysis. Varieties of Algorithmic Information, Heidelberg Germany. June 2015.
- (Invited) Randomness, Brownian motion, Riesz capacity, and complexity. Southeastern Logic Symposium, University of Florida–Gainesville. February 2015.
- Randomness for capacities with applications to random closed sets. Computability, Complexity, and Randomness, Singapore. June 2014.
- (Invited) Schnorr randomness for noncomputable measures. Joint Math Meetings, Special Session on Logic and Probability, Baltimore USA. January 2014.
- (Invited) Schnorr randomness and computable analysis. AMS Sectional Meeting, Special Session on Computability Across Mathematics, St. Louis USA. October 2013.
- (Invited) On the computability of rates of metastable convergence. Logic Seminar, University of Pennsylvania. October 2013.
- Algorithmic randomness for Doob’s martingale convergence theorem in continuous time. Computability and Complexity in Analysis, Nancy France. July 2013.
- Schnorr randomness for noncomputable measures. Computability in Europe, Milan Italy. July 2013.
- (Invited) Transformations which preserve computable randomness. Algorithmic Randomness and Analysis, Nancy France. June 2013.
- (Invited) Computable randomness and martingales a la probability theory. Logic Seminar, Pennsylvania State University. November 2012.
- Ultrafilters and ergodic theory. Arbeitsgemeinschaft: Ergodic Theory and Combinatorial Number Theory, Oberwolfach, Germany. October 2012.
- (Invited) Computable randomness for computable probability spaces. Twelfth Asian Logic Conference, Wellington New Zealand. December 2011.

- (Invited) Randomness, martingales and differentiability. Randomness and Analysis in Auckland, Auckland New Zealand. December 2011.

TEACHING
EXPERIENCE

Pennsylvania State University, University Park, PA, USA *Mathematics Department*
Course Coordinator

- Math 231 Calculus in Several Variables, Fall 2015.

Course Instructor

- Math 457 Introduction to Mathematical Logic, Spring 2016.
- Math 557 Mathematical Logic (Graduate), Fall 2015.
- Math 558 Foundations of Mathematics (Graduate), Fall 2014.
- Math 230 Calculus and Vector Analysis, Fall 2014.
- Math 457 Introduction to Mathematical Logic, Spring 2014.
- Math 230 Calculus and Vector Analysis, Fall 2013.

Carnegie Mellon University, Pittsburgh, PA, USA *Dept of Mathematical Sciences*
Course Instructor

- 21-122 Integration, Differential Equations and Approximation, Summer 2012.
- 21-122 Integration, Differential Equations and Approximation, Summer 2011.

Teaching Assistant

- 21-127 Concepts of Mathematics, Fall 2012.
- 21-120 Differential and Integral Calculus, Spring 2012.
- 21-127 Concepts of Mathematics, Spring 2011.
- 21-120 Differential and Integral Calculus, Fall 2010.
- 21-111 Calculus I, Fall 2009.
- 21-123 Calculus of Approximation, Spring 2009.
- 21-122 Integration, Differential Equations and Approximation, Fall 2008.

MENTORING
EXPERIENCE

- Undergraduate Thesis Supervisor for Justin Miller. Spring 2015 to Spring 2016.
- Master's Thesis Committee Member for Ryan Wasson. Fall 2015.
- Mentor for Adrian Maler (graduate student of Prof. S. Simpson). Met regularly, discussed research, read papers, and went over his dissertation. Fall 2012 to Summer 2015.
- Supervised an undergraduate Mathematical Logic reading course. Spring, Summer 2014.

PROFESSIONAL
SERVICE

Refereed papers for the following conferences.

- Computability in Europe (3 papers)

Refereed articles for the following journals.

- Annals of Pure and Applied Logic (1 article)
- Computability (1 article)
- Journal of Logic and Analysis (1 article)
- Journal of the ACM (1 article)
- Mathematical Structures in Computer Science (1 article)
- Theory of Computing Systems (4 articles)

Reviewed the following reports.

- “Developing a 21st Century Global Library for Mathematics Research”, National Research Council (142 pages)

Participate regularly on [MathOverflow.com](https://stackoverflow.com), a question and answer site for mathematicians.