

# Johanna N.Y. Franklin

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## Research Interests

Mathematical logic, computability theory, algorithmic randomness, effective analysis, and computable model theory.

## Education

University of California, Berkeley. Berkeley, CA

Ph.D. in Logic, 2007

Advisor: Theodore A. Slaman

Thesis title: Aspects of Schnorr randomness

Carnegie Mellon University. Pittsburgh, PA

M.S. in Mathematical Sciences, 2001

Advisor: James Cummings

Thesis title: Algebras of elementary embeddings

B.S. in Mathematical Sciences with minors in Physics and Linguistics, 2001

Received University Honors and College Honors.

## Employment

Hofstra University, Associate Professor: 2017–present

Assistant Professor: 2014–2017

University of Connecticut, University Postdoctoral Fellow: 2011–2014

Dartmouth College, Visiting Assistant Professor: 2010–2011

University of Waterloo, Postdoctoral Fellow: Spring 2010

Fields Institute, Postdoctoral Fellow: Fall 2009

Participant in the Thematic Program on the Foundations of Computational Mathematics.

National University of Singapore, Visiting Fellow: 2007–2009

## Visiting Positions

Victoria University of Wellington, Visiting Associate Professor: September–November 2019

## Honors and Awards

### Research/Academic

Simons Foundation Collaboration Grant for Mathematicians, 2016–2021

Hofstra University Faculty Research and Development Grants, 2016, 2017, 2018, and 2019

AWM Mathematics Travel Grants, February 2013 and February 2015

co-author (PI: Ekaterina Fokina), Austrian Science Fund, FWF Grant P23989

“Algorithmic randomness and computable model theory,” June 2011

NSF Graduate Research Fellowship, 2001–2003 and 2005–2006

Berkeley Fellowship, 2003–2005 (awarded to less than 1% of Berkeley graduate students)

Phi Beta Kappa, Phi Kappa Phi, Pi Mu Epsilon

### Teaching

MAA Metro New York Section Award for Distinguished Teaching, 2018

## Publications

### Published/Accepted

1. Lowness for isomorphism, countable ideals, and computable traceability (with Reed Solomon). *Mathematical Logic Quarterly*, to appear.
2. Taking the path computably traveled (with Dan Turetsky). *Journal of Logic and Computation*, 29(6), pp. 969-973, 2019.
3. Algorithmic randomness and Fourier analysis (with Timothy H. McNicholl and Jason Rute). *Theory of Computing Systems*, 63(3), pp. 567–586, 2019.
4. Lowness for isomorphism and degrees of genericity (with Dan Turetsky). *Computability*, 7(1), pp. 1–6, 2018.
5. Strength and weakness in computable structure theory (survey paper). In A. Day et al., eds., *Lecture Notes in Computer Science 10010*, pp. 302–323. Springer-Verlag, 2017.
6. Genericity and UD-random reals (with Wesley Calvert). *Journal of Logic and Analysis*, 7(4), pp. 1–10, 2015.
7. Randomness and non-ergodic systems (with Henry Towsner). *Moscow Mathematical Journal*, 14(4), pp. 711–744, 2014.
8. Degrees that are low for isomorphism (with Reed Solomon). *Computability*, 3(2), pp. 73–89, 2014.
9.  $\omega$ -change randomness and weak Demuth randomness (with Keng Meng Ng). *Journal of Symbolic Logic*, 79(3), pp. 776-791, 2014.
10. Lowness for difference tests (with David Diamondstone). *Notre Dame Journal of Formal Logic*, 55(1), pp. 63–73, 2014.
11. Anti-complex sets and reducibilities with tiny use (with Noam Greenberg, Frank Stephan, and Guohua Wu). *Journal of Symbolic Logic*, 78(4), pp. 1307–1327, 2013.
12. Local computability for ordinals (with Asher M. Kach, Russell Miller, and Reed Solomon). In P. Bonizzoni, V. Brattka, and B. Löwe, eds., *Lecture Notes in Computer Science 7921*, pp. 161–170. Springer-Verlag, 2013.
13. Degrees of categoricity and the hyperarithmetical hierarchy (with Barbara F. Csima and Richard A. Shore). *Notre Dame Journal of Formal Logic*, 54(2), pp. 215–231, 2013.
14. Martin-Löf random points satisfy Birkhoff’s ergodic theorem for effectively closed sets (with Noam Greenberg, Joseph S. Miller, and Keng Meng Ng). *Proceedings of the AMS*, 140(10), pp. 3623–3628, 2012.
15. Relativizations of randomness and genericity notions (with Frank Stephan and Liang Yu). *Bulletin of the London Mathematical Society*, 43(4), pp. 721–733, 2011.
16. Van Lambalgen’s Theorem and high degrees (with Frank Stephan). *Notre Dame Journal of Formal Logic*, 52(2), pp. 173–185, 2011.
17. A superhigh diamond in the c.e.  $tt$ -degrees (with Douglas Cenzer, Jiang Liu, and Guohua Wu). *Archive for Mathematical Logic*, 50(1–2), pp. 33–44, 2011.
18. Difference randomness (with Keng Meng Ng). *Proceedings of the AMS*, 139(1), pp. 345–360, 2011.
19. Subclasses of the weakly random reals. *Notre Dame Journal of Formal Logic*, 51(4), pp. 417–426, 2010.
20. Schnorr trivial sets and truth-table reducibility (with Frank Stephan). *Journal of Symbolic Logic*, 75(2), pp. 501–521, 2010.
21. Lowness and highness properties for randomness notions (survey paper). In T. Arai et al., eds., *Proceedings of the 10th Asian Logic Conference*, pp. 124–151. World Scientific, 2010.
22. Schnorr triviality and genericity. *Journal of Symbolic Logic*, 75(1), pp. 191–207, 2010.

## Published/Accepted

23. Hyperimmune-free degrees and Schnorr triviality. *Journal of Symbolic Logic*, 73(3), pp. 999–1008, 2008.
24. Schnorr trivial reals: A construction. *Archive for Mathematical Logic*, 46(7–8), pp. 665–678, 2008.

## Other publications

25. Six papers on lowness and highness for randomness notions. *Bulletin of Symbolic Logic*, 19(1), pp. 115–118, 2013.
26. Greg Chaitin: Mathematics, Biology, and Metabiology. *Fields Notes*, 10(2), p. 8, 2010.

## Postgraduate Teaching Experience

### Hofstra University

- Mathematics of Elections (First-Year Seminar)
- Elementary Mathematical Statistics
- Mathematical Excursions
- Elementary Set Theory, Logic, and Probability
- Analytic Geometry and Calculus I
- Analytic Geometry and Calculus III
- Applications of Probability to Actuarial Problems
- Introduction to Higher Mathematics
- Elementary Differential Equations
- Linear Algebra
- Mathematical Probability and Statistics 1 & 2
- History of Mathematics
- Advanced Calculus
- Mathematical Logic

### University of Connecticut

- Honors Calculus I
- Honors Multivariable Calculus
- Applied Linear Algebra
- Elementary Differential Equations
- Transition to Advanced Mathematics
- History of Mathematics
- Probability
- Algorithmic Randomness and Computability Theory (graduate topics course)

### Dartmouth College

- Introduction to Calculus
- Calculus of Vector-valued Functions
- Discrete Probability

### University of Waterloo

- Algebra for Honors Mathematics

## Postgraduate Teaching Experience (continued)

National University of Singapore

Combinatorial Analysis

Set Theory

Discrete Structures (School of Computing) (tutorial responsibilities)

Reverse Mathematics (graduate short course)

## Talks

### Invited conference talks

Workshop on Computability Theory (Leeds, UK), July 2019

2019 Spring AMS Eastern Sectional Meeting (Hartford, CT), April 2019

2019 Joint Mathematics Meetings (AMS special session) (Baltimore, MD), January 2019

2019 Joint Mathematics Meetings (AMS-ASL session) (Baltimore, MD), January 2019

Computability in Europe 2018 (Kiel, Germany), July 2018 (plenary)

Logic Colloquium 2018 (Udine, Italy), July 2018

Workshop on Computability Theory and its Applications (Waterloo, Canada), June 2018

Manhattan Algebra Day (New York City, NY), December 2017

Twelfth International Conference on Computability, Complexity and Randomness (Mysuru, India), July 2017 (plenary)

Groups and Computation: Interaction Between Geometric Group Theory, Computability, and Computer Science (Hoboken, NJ), June 2017 (plenary)

Computability and Complexity Symposium 2017 (Raumati, New Zealand), January 2017

Computability, Randomness, and Applications (Luminy, France), June 2016

New England Recursion and Definability Seminar (Springfield, MA), April 2016

2015 Fall AMS Central Sectional Meeting (Chicago, IL), October 2015

2015 ASL North American Annual Meeting (Urbana, IL), March 2015

Southeastern Logic Symposium 2015 (Gainesville, FL), February 2015

Shonan Seminar on Algorithmic Randomness and Complexity (Kanagawa, Japan), September 2014

Eleventh International Conference on Computability and Complexity in Analysis (Darmstadt, Germany), July 2014 (plenary)

Logic Colloquium 2014 (Vienna, Austria), July 2014

Computability in Europe 2013 (Milan, Italy), July 2013

Analysis, Randomness, and Applications (Nancy, France), June 2013

Buenos Aires Semester in Computability, Complexity, and Randomness, May 2013

2013 Spring AMS Eastern Sectional Meeting (Chestnut Hill, MA), April 2013

2013 Joint Mathematics Meetings (AMS-ASL session) (San Diego, CA), January 2013

2012 Spring AMS Eastern Sectional Meeting (Washington, DC), March 2012

Dagstuhl Seminar on Computability, Complexity and Randomness (Wadern, Germany), January 2012

2011–12 ASL Winter Meeting (Boston, MA), January 2012

2011 Spring AMS Eastern Sectional Meeting (Worcester, MA), April 2011

### **Invited conference talks (continued)**

2010 Fall AMS Central Sectional Meeting (Notre Dame, IN), November 2010  
Logic Colloquium 2010 (Paris, France), July 2010  
5th Conference on Logic, Computability and Randomness (Notre Dame, IN), May 2010  
Southeastern Logic Symposium 2010 (Gainesville, FL), February 2010  
4th Conference on Logic, Computability, and Randomness (Luminy, France), July 2009  
FRG Workshop on Algorithmic Randomness (Madison, WI), May 2009  
2009 ASL North American Annual Meeting (Notre Dame, IN), May 2009  
10th Asian Logic Conference (Kobe, Japan), September 2008  
Joint Meeting of the AMS–NZMS 2007 (Wellington, New Zealand), December 2007  
2006 Fall AMS Eastern Sectional Meeting (Storrs, CT), October 2006  
Southeastern Logic Symposium 2006 (Gainesville, FL), March 2006

### **Seminars and colloquia**

Victoria University of Wellington logic seminar, October 2019  
National University of Singapore logic seminar, August 2019  
Wisconsin Logic Seminar, April 2019  
University of Pennsylvania Logic and Computation seminar, October 2015 and March 2019  
Rutgers Logic Seminar, February 2019  
Notre Dame Mathematical Logic Seminar, May 2010 and March 2018  
Stevens Institute of Technology Algebraic Cryptography Center Seminar, February 2018  
Central Connecticut State University Mathematics Department Colloquium, February 2018  
Iowa Colloquium on Information, Complexity and Logic in Computation, November 2017  
George Washington University logic seminar, March 2006 and March 2016  
Adelphi University mathematics and computer science seminar, March 2016  
Fordham University analysis seminar, February 2016  
Vassar College Association for Women in Mathematics lecture, April 2015  
Penn State logic seminar, April 2011 and April 2015  
Iowa State University Department of Mathematics colloquium, April 2015  
CUNY Logic Workshop, December 2010, October 2013, and March 2015  
UConn Logic Colloquium, April 2014  
Kurt Gödel Research Center, June 2013  
Harvard/MIT logic seminar, April 2013  
Southern Illinois University Department of Mathematics colloquium, March 2013  
Southern Illinois University applied mathematics seminar, March 2013  
New England Recursion and Definability Seminar (Storrs, CT), April 2012  
Dartmouth Mathematics Department colloquium, September 2010  
Southern Wisconsin Logic Colloquium, June 2010  
Cornell logic seminar, November 2009  
University of Waterloo Pure Mathematics Department colloquium, September 2009  
MIT logic seminar, September 2009  
Summer School in Logic, National University of Singapore, July 2006

## Other talks

Undergraduate mathematics seminar, Bard College at Simon's Rock, November 2015  
S.I.G.M.A. seminar, UConn, March 2012 and September 2013  
UConn Mathematics REU Seminar, July 2013  
Mathematics Triple, UMass, July 2012  
UConn Math Club, September 2011  
Boston Math Circle, May 2011  
Dartmouth Mathematical Society, January 2011  
Computability Learning Seminar, University of Waterloo, January–February 2010  
MGSA Graduate Student Seminar, University of Toronto, October 2009  
MIT Women in Mathematics Lecture Series, September 2009  
NUS Mathematics Society, February 2009  
Nanyang Technological University, April 2008  
Undergraduate mathematics seminar, UC, Berkeley, April 2007  
Many Cheerful Facts, UC, Berkeley, February 2005 and March 2006

## Student Research

### Hofstra University Honors Theses Directed

Nicholas Bragman, “A Partial Classification of Singular Sign Pattern Matrices,” 2019  
Richard Myers, “On the Hierarchy of Algorithmic Randomness Definitions,” 2017

### Hofstra University Honors Options

Analytic Geometry and Calculus III, Spring 2019  
Linear Algebra, Fall 2014  
MAA Metropolitan New York Section 2015 Annual Meeting  
Richard Myers, “Matrix Factorization and the ADI Method: The Common Element”  
Elementary Differential Equations, Spring 2020  
Mathematical Probability and Statistics 1, Falls 2015–2018  
MAA Metropolitan New York Section 2017 Annual Meeting  
Jason Belanger, “A Probabilistic Analysis of *Songs for a New World*”  
Jonathan Butterworth, “An Analysis of *Risk* Using Markov Chains”  
Mathematical Probability and Statistics 2, Springs 2016–2020  
Advanced Calculus, Fall 2016

### Hofstra University Summer Science Research Program

Supervised one high school student on the project “Blind Blackjack,” 2015  
Robert Konoff, “Blind Blackjack: A Computer Programming Approach to Probability”  
MAA Metropolitan New York Section 2016 Annual Meeting

### Master's thesis committees

Whitney Patton Turner, UConn, Spring 2012 (Associate Advisor)  
Clinton Loo, University of Waterloo, Winter 2010 (Reader)

### Ph.D. thesis committees

Rose Weisshaar, University of Notre Dame, Summer 2019 (Reader)

## Service to the Profession

Mathematical Association of America

Secretary, Metro New York Section, 2018–present

Vice-Chair for Four-Year Colleges, Metro New York Section, 2015–2018

Departmental Liaison, 2015–present

Association for Women in Mathematics

Program Committee, 2019–present

Essay Contest Committee, 2015–present (Chair, 2018–present)

AWM-MAA Sectional Liaison Committee, 2019–present

Association Computability in Europe

Council Member, 2019–present

Program Committees

Computability in Europe 2019

Computability, Complexity and Randomness 2019

ASL North American Annual Meeting 2019

Computability and Complexity in Analysis 2017

ASL Winter Meeting 2017

Computability, Complexity and Randomness 2016

Computability in Europe 2015

Local Organizing Committees

MAA Metro NY Section 2018 Annual Meeting (Chair/Coordinator)

Sessions organized

Special Session in “Lowness Notions in Computability” for Computability in Europe 2019  
(with Joseph S. Miller)

Special Session in “Computability Theory: Pushing the Boundaries” for the Spring AMS  
Eastern Sectional Meeting, May 2017 (with Russell Miller)

AMS-ASL Special Session in “Logic and Probability” for the Joint Mathematics Meetings,  
January 2014 (with Wesley Calvert, Doug Cenzer, and Valentina Harizanov)

Special Session in “Computability Across Mathematics” for the Fall AMS Central Sectional  
Meeting, October 2013 (with Wesley Calvert)

Reviewer for *Mathematical Reviews*, 2015–present

Referee for the *Proceedings of the AMS*, the *Pacific Journal of Mathematics*, the *Journal of Symbolic Logic*, the *Annals of Pure and Applied Logic*, *Information and Computation*, the *Notre Dame Journal of Formal Logic*, the *ACM Transactions on Computational Logic*, *Theory of Computing Systems*, *Computability*, *Information Processing Letters*, the *Journal of Logic and Computation*, *Philosophia Mathematica*, and various computer science conferences, including STACS, ISIT, and CiE

## University Service

Hofstra University

First Year Common Reading Selection Committee, 2017 and 2018

HCLAS Standards and Review Committee, 2015–2018 (Chair, 2017–18)

University Senate Committee on the Library, 2015–2017

Seminar organizer, Department of Mathematics, 2015–2019

Advisor, Actuarial Science Club, 2015–present

University of Connecticut

Speakers Committee for the Group in Philosophical and Mathematical Logic, 2012–2014

Fields Institute

Organizer of the Postdoctoral Seminar Series, Fall 2009

## Outreach Activities

Panelist on "Know Your Lines: Gerrymandering U.S. Elections" for Hofstra Votes, October 2018

Judge for the Association for Women in Mathematics/Math for America Essay Contest,  
2013–present

Judge for the Nassau County Science Competition, June 2016

Invited panelist at the Nebraska Conference for Undergraduate Women in Mathematics,  
January 2016

Speaker in the Women in Computability Workshop at CiE 2015

Participant on the "Preparing for Math Graduate School" panel for the UConn Math Club, April  
2012 and April 2013

Co-organizer of the "Conquering a Conference" discussion for UConn math graduate students,  
December 2012

Participant on the "Diversity in STEM Fields" panel for UConn REU students, July 2012

Mentor in the Dartmouth AWM mentoring program, Fall 2010

Instructor for "Logical Thinking" sessions in the Singapore Mathematical Society's Primary  
Mathematical Olympiad Programme, 2009

Workshop leader and closing speaker at Expanding Your Horizons Singapore, 2008

## Actuarial Exams

Exam P/1: Passed November 2014.

Exam FM/2: Passed December 2015.

## Mathematical Art

"110/193," exhibited at the Mathematical Art Exhibition at the Joint Mathematics Meetings,  
January 15–18, 2020.

"A Borromean ring of Möbius strips," exhibited at the Joint Mathematics Meetings in association  
with the AMS Special Session on Mathematics and Mathematics Education in Fiber Arts,  
January 15–18, 2014.

"Möbius strips with a twist," exhibited at Lafayette College's Art Galleries as part of the "Sticks,  
Hooks, and the Möbius: Knit and Crochet Goes Cerebral" exhibit, January 8–February 5, 2012.