

# 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, Professor: 2023–present

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, 2016–2023

Hofstra University Faculty Research and Development Grants, 2016–2020

AWM Mathematics Travel Grants, February 2013 and February 2015

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

Phi Beta Kappa, Phi Kappa Phi, Pi Mu Epsilon

### Teaching

MAA Metro New York Section Award for Distinguished Teaching, 2018

### Service

MAA Metro New York Section Award for Distinguished Service, 2022

## Publications

### Published/Accepted articles

1. Structural highness notions (with Wesley Calvert and Dan Turetsky). *Journal of Symbolic Logic*, to appear.
2. A Church-Turing Thesis for Randomness? In L. De Mol et al., eds., *Lecture Notes in Computer Science 12813*, pp. 217–226. Springer, 2021.
3. Degrees of and lowness for isometric isomorphism (with Timothy H. McNicholl). *Journal of Logic and Analysis*, 12(6), pp. 1–23, 2020.
4. Key developments in algorithmic randomness (survey paper with Christopher P. Porter). In J. Franklin and C. Porter, eds., *Algorithmic Randomness: Progress and Prospects*, pp. 1–39. Cambridge University Press, 2020.
5. Relativization in randomness (survey paper). In J. Franklin and C. Porter, eds., *Algorithmic Randomness: Progress and Prospects*, pp. 134–174. Cambridge University Press, 2020.
6. Lowness for isomorphism, countable ideals, and computable traceability (with Reed Solomon). *Mathematical Logic Quarterly*, 66(1), pp. 104–114, 2020.
7. Taking the path computably traveled (with Dan Turetsky). *Journal of Logic and Computation*, 29(6), pp. 969–973, 2019.
8. Algorithmic randomness and Fourier analysis (with Timothy H. McNicholl and Jason Rute). *Theory of Computing Systems*, 63(3), pp. 567–586, 2019.
9. Lowness for isomorphism and degrees of genericity (with Dan Turetsky). *Computability*, 7(1), pp. 1–6, 2018.
10. 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.
11. Genericity and UD-random reals (with Wesley Calvert). *Journal of Logic and Analysis*, 7(4), pp. 1–10, 2015.
12. Randomness and non-ergodic systems (with Henry Towsner). *Moscow Mathematical Journal*, 14(4), pp. 711–744, 2014.
13. Degrees that are low for isomorphism (with Reed Solomon). *Computability*, 3(2), pp. 73–89, 2014.
14.  $\omega$ -change randomness and weak Demuth randomness (with Keng Meng Ng). *Journal of Symbolic Logic*, 79(3), pp. 776–791, 2014.
15. Lowness for difference tests (with David Diamondstone). *Notre Dame Journal of Formal Logic*, 55(1), pp. 63–73, 2014.
16. 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.
17. 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.
18. Degrees of categoricity and the hyperarithmetic hierarchy (with Barbara F. Csima and Richard A. Shore). *Notre Dame Journal of Formal Logic*, 54(2), pp. 215–231, 2013.
19. 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.
20. Relativizations of randomness and genericity notions (with Frank Stephan and Liang Yu). *Bulletin of the London Mathematical Society*, 43(4), pp. 721–733, 2011.
21. Van Lambalgen’s Theorem and high degrees (with Frank Stephan). *Notre Dame Journal of Formal Logic*, 52(2), pp. 173–185, 2011.

## Published/Accepted articles (continued)

22. 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.
23. Difference randomness (with Keng Meng Ng). *Proceedings of the AMS*, 139(1), pp. 345–360, 2011.
24. Subclasses of the weakly random reals. *Notre Dame Journal of Formal Logic*, 51(4), pp. 417–426, 2010.
25. Schnorr trivial sets and truth-table reducibility (with Frank Stephan). *Journal of Symbolic Logic*, 75(2), pp. 501–521, 2010.
26. 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.
27. Schnorr triviality and genericity. *Journal of Symbolic Logic*, 75(1), pp. 191–207, 2010.
28. Hyperimmune-free degrees and Schnorr triviality. *Journal of Symbolic Logic*, 73(3), pp. 999–1008, 2008.
29. Schnorr trivial reals: A construction. *Archive for Mathematical Logic*, 46(7–8), pp. 665–678, 2008.

## Other publications

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

## Books

*Revolutions and Revelations in Computability* (co-edited with Ulrich Berger, Florin Manea, and Arno Pauly). Springer, Lecture Notes in Computer Science, vol. 13359, 2022.

*Algorithmic Randomness: Progress and Prospects* (co-edited with Christopher P. Porter). Cambridge University Press, Lecture Notes in Logic, vol. 50, 2020.

## Postgraduate Teaching Experience

Hofstra University

Mathematics of Elections (First-Year Seminar)  
Elementary Mathematical Statistics  
Mathematical Excursions  
Logic, Sets, and Probability  
Analytic Geometry and Calculus I & III  
Mathematical Finance  
Applications of Probability to Actuarial Problems  
Introduction to Higher Mathematics  
Elementary Differential Equations  
Linear Algebra  
Mathematical Probability and Statistics 1 & 2  
Preparation for Exam FM/2  
History of Mathematics  
Real Analysis 1  
Mathematical Logic  
Dangerous Ideas (Philosophy Department, co-taught)

## Postgraduate Teaching Experience (continued)

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

National University of Singapore

Combinatorial Analysis

Set Theory

Reverse Mathematics (graduate short course)

## Talks

### Invited conference talks (plenaries noted by ☆)

- ☆ International Conference on Computability, Complexity and Randomness (Kochel, Germany), July 2023
- ☆ Logic Colloquium 2023 (Milan, Italy), June 2023 (*withdrawn for ethical reasons*)
- MAMLS Spring Fling (New Brunswick, NJ), May 2023
- 2023 Joint Mathematics Meetings (AMS special session) (Boston, MA), January 2023
- Center for Formal Epistemology Workshop on Learning, Randomness, and Complexity (Pittsburgh, PA), October 2023
- International Conference on Computability, Complexity and Randomness (Cambridge, UK), June 2022
- ☆ Logic Association of Malaysia Inaugural Conference (online), October 2021
- Computability in Europe 2021 (HaPoC satellite workshop) (Ghent, Belgium), July 2021
- ☆ 2021 ASL North American Annual Meeting (South Bend, IN), June 2021
- 2021 Joint Mathematics Meetings (AMS special session) (Washington, DC), January 2021
- Deutsche Mathematiker-Vereinigung Jahrestagung 2020 (online, Chemnitz, Germany), September 2020
- Southeastern Logic Symposium 2020 (Gainesville, FL), March 2020
- 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
- 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

### Invited conference talks (continued)

- ★ Twelfth International Conference on Computability, Complexity and Randomness (Mysuru, India), July 2017
- ★ Groups and Computation: Interaction Between Geometric Group Theory, Computability, and Computer Science (Hoboken, NJ), June 2017
- 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
- 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
- New England Recursion and Definability Seminar (Storrs, CT), April 2012
- 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
- 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

### Colloquium talks

- Central Connecticut State University Mathematics Department Colloquium, February 2018 and May 2023
- Talk Math With Your Friends, April 2020
- Iowa Colloquium on Information, Complexity and Logic in Computation, November 2017
- Vassar College Association for Women in Mathematics lecture, April 2015
- Iowa State University Department of Mathematics colloquium, April 2015
- UConn Logic Colloquium, April 2014
- Southern Illinois University Department of Mathematics colloquium, March 2013

Dartmouth Mathematics Department colloquium, September 2010  
University of Waterloo Pure Mathematics Department colloquium, September 2009

### **Seminar talks**

CUNY Logic Workshop, December 2010, October 2013, March 2015, March 2020, and February 2023  
Leeds-Ghent Virtual Logic Seminar, February 2022  
Xiamen University ICT Department, November 2021  
Online Logic Seminar, December 2020  
McMaster Women in Mathematics seminar, October 2020  
Lógicos em Quarentena, July 2020  
Stevens Institute of Technology Algebraic Cryptography Center Seminar, February 2018 and April 2020  
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  
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  
Penn State logic seminar, April 2011 and April 2015  
Kurt Gödel Research Center, June 2013  
Harvard/MIT logic seminar, April 2013  
Southern Illinois University applied mathematics seminar, March 2013  
Southern Wisconsin Logic Colloquium, June 2010  
Cornell logic seminar, November 2009  
MIT logic seminar, September 2009

### **Other talks**

QR Connections Series, Wellesley College, October 2022  
Math National Honors Society, Bel Air High School (MD), February 2022  
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

## **Undergraduate/High School Student Research**

### Polymath Jr. Program

Project Mentor, 2021 and 2022 and Ethics Educator, 2022 and 2023

### Hofstra University Honors Theses

Joseph Ronzetti, “A Statistical Analysis of Mana-Positive Mana Rocks,” 2021

Nicholas Bragman, “A Partial Classification of Singular Sign Pattern Matrices,” 2019

Richard Myers, “On the Hierarchy of Algorithmic Randomness Definitions,” 2017

### Hofstra University Summer Science Research Program

Research Mentor, 2020 and 2015

## **Graduate Committees**

### Ph.D. thesis committees

Thomas Dickson, Lehigh University, 2021

Rose Weisshaar, University of Notre Dame, 2019

### Master’s thesis committees

Whitney Patton Turner, University of Connecticut, 2012

Clinton Loo, University of Waterloo, 2010

## **Service to the Profession**

### Mathematical Association of America

MAA Representative on the AMS-MAA Mathfest Joint Lecture Committee, 2022–present

Secretary, Metro New York Section, 2018–present

Section Representative, Metro New York Section, 2020–2023

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

### Association for Women in Mathematics

Education & Outreach Committee (Program Committee until 2022), 2019–present (Chair, 2022–present)

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

AWM-MAA Liaison Committee, 2019–2021

### Association Computability in Europe

Executive Committee, Member-at-Large, 2020–present

Council Member, 2019–present

### Editorial positions

*Archive for Mathematical Logic*, Editor, 2023–present

*Bulletin of Symbolic Logic*, Reviews Editor, 2023–present

### Workshops organized

“A Convergence of Computable Structure Theory, Analysis, and Randomness” at BIRS, 2023  
(with Timothy McNicholl and Linda Brown Westrick)

### Program Committees

Computability, Complexity and Randomness 2024 (co-chair), 2019, and 2016

Computability in Europe 2022 (co-chair), 2019, and 2015

ASL North American Annual Meeting 2019

Computability and Complexity in Analysis 2017

ASL Winter Meeting 2017

## Service to the Profession (continued)

Sessions and panels organized

Special Session in “Computability Theory” for the ASL North American Annual Meeting, 2023 (with Matthew Harrison-Trainor)

Panel on “Mathematical Logic in the Pandemic Era” for the ASL North American Annual Meeting, 2022 (with Deirdre Haskell)

AMS Special Session in “Polymath Jr: Mentoring and Learning”, Joint Mathematics Meetings, 2022 (with Kira Adaricheva, Zhanar Berikkyzy, Seoyoung Kim, Steven J. Miller, Adam Sheffer, and Yunus E. Zeytuncu), cancelled when the JMM was rescheduled

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)

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*, the *Journal of Mathematical Logic*, the *Journal of Mathematics and the Arts*, and various computer science conferences, including STACS, ISIT, and CiE

Reviewer for *Mathematical Reviews*, 2015–present

## University Service

Hofstra University

Seminar organizer, Department of Mathematics, 2015–2019, 2020–present

College Task Force on Diversity, Equity, and Inclusion, 2023–present

Provost’s Classroom Committee, 2022–present

Stessin Prize Selection Committee, 2023

University Appeals Board, 2020–2022

First Year Common Reading Selection Committee, 2017 and 2018

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

University Senate Committee on the Library, 2015–2017

University of Connecticut

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



## **Outreach Activities**

Panelist on “How COVID has changed in-person instruction” for the Metro NY MAA Annual Meeting, April 2023

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

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

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.