RACHEL BAILEY

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EDUCATION

University Of Connecticut, Ph.D, Mathematics   *Fall 2019 - August 2024*
Advisors: Maria Gordina and Maxim Derevyagin

University of Connecticut Bachelor of Arts, Mathematics   *Fall 2016-Fall 2018*
Minor in statistics

Three Rivers Community College   *Spring 2015 -Spring 2016*

EMPLOYMENT

Assistant Professor, Bentley University   *Fall 2024-Present*

Graduate Assistant, University of Connecticut   *Fall 2019-Present*

Graduate Complex Analysis Qualifying Exam Tutor, UConn   *Summer 2024, Summer 2021, Winter 2021*

Graduate Complex Analysis Grader, UConn   *Spring 2022*

Undergraduate Math Q-Centor tutor, UConn   *Spring 2018, Fall 2018*

TEACHING EXPERIENCE

Assistant Professor Bentley University

- MA 131-1 - Calculus I   *Fall 2024*

Graduate Assistant University of Connecticut

- MATH 1071Q Calculus for Business and Economics *(primary instructor)*   *Fall 2023*
- MATH 1131Q Calculus 1 *(teaching assistant)*   *Fall 2019, Fall 2023*
- MATH 2410 Elementary Differential Equations *(primary instructor)*   *Spring 2023*
- MATH 2110Q Multivariable Calculus *(teaching assistant)*   *Fall 2022*
- MATH 1132Q Calculus 2 *(teaching assistant)*   *Spring 2020, Fall 2021*
- MATH 1060Q Pre Calculus *(primary instructor)*   *Fall 2020*

PAPERS

R. Bailey and M. Derevyagin. *DEK-type orthogonal polynomials and a modification of the Christoffel formula*. J. Comput. Appl. Math. 438 (2024), Paper No. 115561.

R. Bailey and M. Derevyagin. *Complex Jacobi matrices generated by Darboux transformations*. J. Approx. Theory 288 (2023), Paper No. 105876, 33 pp.

R. Bailey and E. Gunawan. *Cluster Algebras and Binary Subwords*. *Order* 39 (2022), no.1, 55–69.

PEER-REVIEWED CONFERENCE PROCEEDINGS

R. Bailey and E. Gunawan. *Cluster Algebras and Binary Words. Sem. Lothar. Combin.* 82B (2020), Art. 81, 12pp.

PREPRINTS

B. Akwei et al. Convergence, optimization and stability of singular eigenmaps. 2024. arXiv: 2406.19510 [math.PR]. url: https://arxiv.org/abs/2406.19510.

R. Bailey, S. Costa, M. Derevyagin, C. Findley and K. Zuang. Jacobi matrices that realize perfect quantum state transfer and Early State Exclusion. 2024. arXiv: 2411.06047 [quant.ph]. url: https://arxiv.org/abs/2411.06047

IN PREPARATION

R. Bailey, F. Baudoin, M. Gordina, T. Campos, A. Gannon, B. Hanzsek-brill, C. Marrs, A. Neuschotz, T. Rabe, and E. Winters. A Characterization of Fractional Gaussian Fields on S^1 and the d-Torus. (preprint), 2022.

UNDERGRADUATE RESEARCH MENTORSHIP

UConn Mathematics REU Graduate Mentor* *Summer 2024*
Laplacian Eigenmaps, orthogonal polynomials, quantum information

UConn Mathematics REU Graduate Mentor* *Summer 2023*
Laplacian Eigenmaps

UConn Directed Reading Program *Spring 2023*
Mentored an undergraduate student through a semester-long independent study on random walks on graphs

UConn Mathematics REU Graduate Mentor * *Summer 2022*
Fractional Gaussian Fields on Surfaces and Graphs

*Duties included of teaching an introduction to probability, helping write abstracts for the Young Mathematicians Conference, and directing students through the process of research and writing a research paper.

HONORS AND AWARDS

UConn Summer Doctoral Dissertation Fellowship *Summer 2024*

UConn Predoctoral Fellowship *Spring 2024*

Louis J. Deluca Memorial Award: Excellence in Teaching *Spring 2023*

Connie Strange Graduate Community Award *Spring 2023*

UConn Provost "Excellence In Teaching" *Fall 2019, Fall 2020*

UConn Babbidge Scholar *February 2017*

UConn Aetna Award nominee for *The Language of Mathematics* *January 2017*

SERVICE

UConn Sports Analytics Symposium *April 2024*
Volunteer judge for the poster session

MathCounts *February 2023/2024*
Volunteer grader

UConn SIGMA Organizer *Fall 2022-Spring 2024*
Organized speakers for the weekly SIGMA seminar

Volunteer math tutor for the UConn Women in Math, Science and Engineering learning community *Spring 2022, Fall 2022*

Vice President of AMS Graduate Student Chapter *Fall 2020-Spring 2023*

Graduate Student Mentor *Fall 2020-Present*
Mentored first year graduate students

UCONN AMS Integration Bee *October 2019, March 2020, October 2021, and October 2022*
Organized and judged the integration bee for undergraduate students both online and in person

RESEARCH EXPERIENCE

Research Assistant supported by NSF DMS grant no. 2246549	*Spring 2024*
Research Assistant supported by NSF DMS grant no. 2008844	*Summer 2021, Spring 2022*
Research Assistant through Research Excellence Program Award for 2020–2021 *Padé approximation in noise filtering, $19,243*	*Spring 2021, Summer 2021*
Research on Coxeter groups and cluster algebras	*Summer 2018*

INVITED TALKS

University of New Mexico Analysis Seminar *April 2024*
"DEK-Type Orthogonal Polynomials" (The Extended Version)

University of Hartford Mathematics Colloquium *March 2024*
"A Random Walk Along the Theory of Orthogonal Polynomials"

JMM Special Session: Numerical Analysis, Spectral Graph Theory, Orthogonal Polynomials, and Quantum Algorithms *January 2024*
"A new perspective on an old example"

AWM JMM 2024 Poster Session and Workshop *January 2024*
"DEK-Type Orthogonal Polynomials"

SIAM Quantum Walks on Graphs Workshop *April 2023*
"Orthogonal Polynomials and Quantum Walks on Graphs"

JMM Special Session: Orthogonal Polynomials and their Applications III *January 2023*
"A Modification of the Christoffel Formula"

Bridgewater State University Math Seminar *December 2022*
"Darboux Transformation and Exceptional Orthogonal Polynomials"

Advances In Operator Theory and Applications to Mathematical Physics *November 2022*
"Modification of the Christoffel Formula"

UConn Math Club *September 2022*
"An Introduction to Orthogonal Polynomials"

SIAM Quantum Computing Workshop *March 2022*
"Probability in Quantum Computing"

UConn SIGMA Seminar *March 2022*
"Orthogonal Polynomials and the Christoffel Formula"

AMS Spring Eastern Sectional Meeting *March 2022*
"The Dubov-Eleonskii-Kulagin Polynomials and a Modification of the Christoffel Formula"

UConn Mathematics Continued Conference *October 2021*
"Orthogonal Polynomials: When Analysis Meets Linear Algebra"

Formal Power Series and Algebraic Combinatorics *July 2019*
Presented "Cluster Algebras and Binary Words" poster

WIMIN at Smith College *September 2018*
"Binary Words and Antichains of Posets"

CONFERENCES AND WORKSHOPS

Séminaire de Mathématiques Supérieures 2023: Periodic and Ergodic Spectral Problems *July 2023*
SLMath Summer School

SIAM Quantum Walks on Graphs Workshop *April 2023*

Advances in Operator Theory and Applications to Mathematica Physics *November 2022*

Joint Mathematics Meeting 2023 *January 2023, 2024*

UConn Teaching Seminar *Fall 2022-Present*

UConn Mathematics Continued Conference *October 2022, 2023, 2024*

Radboud Summer School (Nijmegen, Netherlands) *August 2022*
Orthogonal Polynomials, Special Functions and their Applications

MSRI Workshop: A Celebration for Women in Mathematics *May 2022*

SIAM Quantum Computing Workshop *March 2022*

Analysis Learning Seminar- University of Connecticut *Fall 2020*

Binghampton University Graduate Conference in Algebra and Topology *November 2020*

Formal Power Series and Algebraic Combinatorics (Ljubljana, Slovenia) *July 2019*

ORGANIZATIONS

Member of AWM *Current*

Member of AMS *Current*

Member of Pi Mu Epsilon Mathematical Society *Inducted April 2019*