Robert Dougherty-Bliss

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Research interests

Experimental mathematics; symbolic-numeric computation; difference equations; combinatorics; number theory

Academic positions

Dartmouth College
Instructor of Applied and Computational Mathematics *2024–*
Mentor: Peter Winkler

Johannes Keppler University, Linz
Visitor *August 2023*
Host: Manuel Kauers

Education

Rutgers University — New Brunswick
Ph.D. Mathematics *2019–2024*
Advisor: Doron Zeilberger

Oglethorpe University
B.S. Mathematics; Computer Science *2014–2019*
Summa cum laude, with honors

Publications

[1] Robert Dougherty-Bliss, Charles Kenney, and Doron Zeilberger. "Creating decidable Diophantine equations". In: *The American Mathematical Monthly* (2025+). To appear.

[2] Robert Dougherty-Bliss and Natalya Ter-Saakov. "The Comma Sequence is Finite in Other Bases". In: *Journal of Integer Sequences* (2025+). To appear.

[3] Robert Dougherty-Bliss, Natalya Ter-Saakov, Mits Kobayashi, and Eugene Zima. "Dyadically resolving trinomials for fast modular arithmetic". 2025+. URL: `https://arxiv.org/abs/2508.11043`.

[4] Robert Dougherty-Bliss, Christoph Koutschan, Natalya Ter-Saakov, and Doron Zeilberger. "The (Symbolic and Numeric) Computational Challenges of Counting 0-1 Balanced Matrices". In: *Enumerative Combinatorics and Applications* 5.2 (2025).

[5] Robert Dougherty-Bliss and Manuel Kauers. "Hardinian Arrays". In: *Electronic Journal of Combinatorics* 30 (2023).

[6] Robert Dougherty-Bliss and Doron Zeilberger. "Exploring general Apéry limits via the Zudilin–Straub t-transform". In: *Journal of Difference Equations and Applications* 29.1 (2023), pp. 32–42.

[7] Robert Dougherty-Bliss and Doron Zeilberger. "Lots and Lots of Perrin-Type Primality Tests and Their Pseudo-Primes". In: *Integers* 23 (2023).

[8] Robert Dougherty-Bliss. "Gosper's algorithm and Bell numbers". Submitted. 2022.

[9] Robert Dougherty-Bliss. "Integral Recurrences from A to Z". In: *The American Mathematical Monthly* 129.9 (2022), pp. 805–815.

[10] Robert Dougherty-Bliss. "The Meta-C-Finite Ansatz". In: *Fibonacci Quart* 60.5 (2022), pp. 143–150.

[11] Robert Dougherty-Bliss, Christoph Koutschan, and Doron Zeilberger. "Tweaking the Beukers integrals in search of more miraculous irrationality proofs á la Apéry". In: *The Ramanujan Journal* 58.3 (2022), pp. 973–994.

[12] AJ Bu and Robert Dougherty-Bliss. "Enumerating restricted Dyck paths with context-free grammars". In: *Integers* 21 (2021), pp. 1–14.

[13] Robert Dougherty-Bliss and Doron Zeilberger. "Experimenting with Apéry Limits and WZ pairs". In: *Maple Transactions* 1.2 (2021).

[14] Robert Dougherty-Bliss and Doron Zeilberger. "Automatic conjecturing and proving of exact values of some infinite families of infinite continued fractions". In: *The Ramanujan Journal* (2020), pp. 1–17.

[15] K. Abernathy, Z. Abernathy, R. Dougherty-Bliss, C. Mayer, and H. Whiteside. "Global dynamics of a cancer stem cell treatment model". In: *International Journal of Dynamical Systems and Differential Equations* 9.2 (2019), pp. 176–186.

Invited talks and presentations

[1] Robert Dougherty-Bliss. *p-adically resolving trinomials*. 6th International Computer Algebra Conference, Moscow (online). 2025.

[2] Robert Dougherty-Bliss. *Enumerating Balanced Matrices*. MAA MathFest, Sacramento. 2025.

[3] *Modular arithmetic with trinomial moduli*. Rutgers Experimental Mathematics Seminar. 2025.

[4] *Modular arithmetic with trinomial moduli*. Waterloo Symbolic Computation Seminar. 2025.

[5] *On relative primality and other properties of trinomials*. *Computer Assisted Mathematics*, St. Petersburg (online). 2025.

[6] Robert Dougherty-Bliss. *Balanced Matrices*. Dartmouth Combinatorics Seminar. 2024.

[7] Robert Dougherty-Bliss and George Spahn. *Rectangular Hardinian Arrays*. Poster at ISSAC. 2024.

[8] Robert Dougherty-Bliss and Natalya Ter-Saakov. *The Comma Sequence is Finite in Other Bases*. Fall AMS Central Sectional. 2024.

[9] Robert Dougherty-Bliss, Natalya Ter-Saakov, Christoph Koutschan, and Doron Zeilberger. *Enumerating Balanced Matrices*. Differential Algebra and Related Topics XII (Beijing). 2024.

[10] Robert Dougherty-Bliss. *New primality tests and their (very large) pseudoprimes*. Institute für Algebra Seminar. Linz, Austria, 2023.

[11] Robert Dougherty-Bliss. *New primality tests and their (very large) pseudoprimes*. Fall AMS Southeastern Sectional. Mobile, Alabama, 2023.

[12] Robert Dougherty-Bliss. *Gosper's algorithm and Bell numbers*. Fall AMS Southeastern Sectional. Chattanoga, Tennesee, 2022.

[13] Robert Dougherty-Bliss. *The Meta C-finite ansatz*. 20th International Fibonacci Conference. Sarajevo, Bosnia e Herzegovina, 2022.

[14] Robert Dougherty-Bliss. *The Meta-C-finite ansatz*. Rutgers Experimental Mathematics Seminar. 2022.

[15] Robert Dougherty-Bliss. *Combinatorial Union Busting with Stopped Strings*. New York Combinatorics Seminar. 2021.

[16] Robert Dougherty-Bliss. *More irrationally good approximations from Beukers integrals*. Combinatorial and Additive Number Theory. 2021.

[17] Robert Dougherty-Bliss. *Automagic Inverse Continued Fraction Calculuators*. Rutgers Experimental Mathematics Seminar. 2020.

[18] Robert Dougherty-Bliss. *The Ergonomics of Computer Algebra*. Rutgers Experimental Mathematics Seminar. 2019.

Outreach talks

[1] *How to compute with big numbers*. Rutgers Undergraduate Mathematical Association. 2025.

[2] Robert Dougherty-Bliss. *Identities*. Baruch College REU. 2024.

[3] Robert Dougherty-Bliss. *Proofs by Example*. DIMACS / Baruch College REU. 2023.

[4] Robert Dougherty-Bliss. *Proofs by Example*. Rutgers Undergraduate Mathematical Society. 2023.

[5] Robert Dougherty-Bliss. *When does a sum have an answer?* Rutgers Undergraduate Mathematical Association. 2022.

[6] Robert Dougherty-Bliss. *Mathematical biology for fun and profit*. Central Washington University Math Club. 2021.

Teaching

Dartmouth College

Ordinary Differential Equations ***Winter 2025***
Instructor

Multivariable Calculus ***Winter 2025***
Instructor

Introduction to Calculus ***Fall 2024***
Instructor

Rutgers University

Number Theory ***Summer 2021, Summer 2022***
Instructor

Introduction to Real Analysis ***Spring 2021, Fall 2021, Fall 2023***
Teaching assistant

Introduction to Abstract Algebra ***Fall 2023***
Teaching assistant

Calculus III ***Fall 2022***
Teaching assistant

Calculus II ***Spring 2022, Spring 2023***
Teaching assistant

Calculus I ***Fall 2020***
Teaching assistant

Professional service

Undergraduate Directed Reading Program **Rutgers University**
Mentor *2023*

Arkansas Undergraduate Mathematics Competition
Problem writer / grader *2023*

DIMACS REU
Graduate school panel panelist *2022*

MoMath Masters **National Museum of Mathematics**
Problem writer *2021*

Experimental Mathematics Seminar **Rutgers University**
Co-organizer *2020–2024*

American Mathematical Society Graduate Chapter **Rutgers University**
President *2020–2024*

Graduate Liaison Committee **Rutgers University**
Member *2020–2022*

Combinatorics and Algebras from A to Z
Co-organizer *2021*
Birthday conference in honor of Doron Zeilberger and Amitai Regev.

Reviewer for: Journal of Number Theory, The American Statistician, Discrete Mathematics, Discrete Mathematics Letters, Journal of Computational Algebra

Awards

Rutgers University

Excellence in Leadership and Teaching Award *2024*
University-wide award for leadership and teaching.

TA Teaching Excellence Award *2022, 2023*
In recognition of valuable contributions to undergraduate teaching in the math department.

Oglethorpe University

James Edward Oglethorpe Award *2019*
In recognition of scholarship, leadership, and character. Awarded by university faculty vote.

Sally Hull Weltner Award for Scholarship *2019*
Awarded to Senior with highest grade-point average.

Ronald L. Carlisle Prize *2019*
Given to outstanding Senior in mathematics and computer science.

Past Positions

Data Scientist
Government Accountability Office 🇺🇸 *2023*

Statistical Consultant
League of Women Voters of New Jersey *2022*

Summer Fellow and Instructor
Metric Geometry and Gerrymandering Group, Tufts University and MIT *2018, 2019*

Summer Instructor
Oglethorpe University *2017*

Summer Fellow
Winthrop University *2016*