

NELSON SHUHENG NIU

Pronouns: he/they • Formerly named Shuheng Niu • nsniu@uw.edu

EDUCATION

University of Washington, Seattle, WA – Doctoral Student in Mathematics, Ongoing
Advised by XiaoLin Danny Shi

University of Washington, Seattle, WA – Master of Science in Mathematics, Jun. 2023

Massachusetts Institute of Technology, Cambridge, MA – Bachelor of Science in Mathematics with
Computer Science, Jun. 2021 (Minors in Theater Arts, Writing)

PUBLICATIONS

Joseph Dorta, Samantha Jarvis, and Nelson Niu. "Monoidal Structures on Generalized Polynomial Categories." *Proceedings of the Sixth International Conference on Applied Category Theory*, Electronic Proceedings in Theoretical Computer Science, vol. 397, pp. 84–97, Dec. 2023.
[doi:10.4204/EPTCS.397.6](https://doi.org/10.4204/EPTCS.397.6)

ACCEPTED FOR PUBLICATION

Nelson Niu and David I. Spivak. *Polynomial Functors: A Mathematical Theory of Interaction*. Cambridge University Press. To appear. URL: <https://topos.site/poly-book.pdf>

Tanya Khovanova and Nelson Niu. "m-Modular Wythoff." To appear in *Games of No Chance 6*, MSRI Publications. [arXiv:1608.01025](https://arxiv.org/abs/1608.01025) [math.CO]

PREPRINTS

Nelson Niu and David I. Spivak. "Collectives: Compositional protocols for contributions and returns." Dec. 2021. [arXiv:2112.11518](https://arxiv.org/abs/2112.11518) [math.CT]

Nelson Niu and Lillian Zhang. "A multiplicity-free Macdonald identity." Aug. 2019. URL: <https://math.mit.edu/research/undergraduate/spur/documents/2019Niu-Zhang.pdf>

TALKS

Applied Category Theory Conference: "Monoidal structures on generalized polynomial categories," 2 Aug. 2023

Joint Mathematics Meetings: AMS Special Session on Applied Category Theory (a Mathematics Research Communities Session), "Monoidal structures on generalized polynomial categories," 5 Jan. 2023

AGI Conference: Technical Keynote, "Polynomial Functors: Natural Formal Models of Interaction," 20 Aug. 2022

RESEARCH POSITIONS

SUMMER RESEARCH ASSOCIATE, TOPOS INSTITUTE – JUN-SEP '21

Supervisor: David Spivak

TEACHING AND MENTORSHIP

TEACHING ASSISTANT, UW MATHEMATICS DEPARTMENT – SEP-DEC '21, JUN-DEC '22, MAR '24-PRESENT

Classes: MATH 125 Calculus with Analytic Geometry II; MATH 126 Calculus with Analytic Geometry III; Math 318 Advanced Linear Algebra: Tools and Applications

Supervisors: Yu Yuan; Kelvin Lam; Zhixu Su; Matthew Conroy; Elena Pezzoli

TUTOR, UW MATHEMATICS DEPARTMENT – MAR-JUN '23, JAN-MAR '24

Program: Math Major Study Hall

Supervisor: Jennifer Taggart

MENTOR, WASHINGTON DIRECTED READING PROGRAM – SEP '21-DEC '23

Students: Seoyoung Cho; Josephine Noone; Hisham Bhatti; Harper Hults; Mitchell Levy; Anthony Xing; Andy Jiang

Texts: *Seven Sketches in Compositionality: An Invitation to Applied Category Theory* by Brendan Fong & David Spivak; *First Concepts of Topology* by W. G. Chinn and N. E. Steenrod

Supervisor: Bobby Wilson

TA MENTOR, UW MATHEMATICS DEPARTMENT – SEP-DEC '23

Mentees: Henry Cladouhos; Tyson Klingner; Andrew Niu

Supervisor: Andrew Loveless

PREDOCTORAL INSTRUCTOR, UW MATHEMATICS DEPARTMENT – JAN-MAR '23, JUN-AUG '23

Classes: MATH 208 Matrix Algebra with Applications; MATH 126 Calculus with Analytic Geometry III

Supervisors: Patrick Perkins; Andrew Loveless

TEACHING ASSISTANT, MIT MATHEMATICS DEPARTMENT – SEP '20-MAY '21

Class: 18.200 Principles of Discrete Applied Math

Supervisors: Michel Goemans, Diego Cifuentes

FREELANCE TUTOR AND INSTRUCTOR – SEP '13-DEC '20

Worked with SpringLight Education Institute, City of Cupertino

Topics: Competition math, coding, writing, competition linguistics, calculus, geometry; for high schoolers & middle schoolers

MENTOR, MIT PRIMES CIRCLE – FEB-MAY '20

Students: Sarala Sharma, Stephanie Lu

Book: *A Walk Through Combinatorics* by Miklós Bóna

Supervisors: Pavel Etingof, Peter Haine

LAB ASSISTANT, MIT EECS DEPARTMENT – FEB-MAY '20

Class: 6.009 Fundamentals of Programming

Supervisor: Adam Hartz

LEADERSHIP, VOLUNTEER, AND OUTREACH

UAW LOCAL 4121 UNION – FEB '23-PRESENT

Positions: Academic Student Employee Head Steward (Dec '23-Present); Academic Student Employee Department Steward (Feb '23-Dec '23)

MIT COUNCIL FOR MATH MAJORS – SEP '20-MAY '21

Positions: Representative to MIT Math Diversity & Community Building Committee; Structural Lead

MIT SHAKESPEARE ENSEMBLE – MAY '18-MAY '21

Positions: Chair (May '19-May '21); Office-at-Large (May '18-May '19)

SKILLS

Languages: English, Mandarin

Programming languages: Python, Java, C++, Haskell, Coq, Idris, Agda, Lean, Mathematica, LaTeX

Other: Project management, creative writing, acting, stage directing

AWARDS & HONORS

UW Math Excellence in Teaching Award: Awarded 2023; Finalist 2022

UW Departmental Fellowship (Top Scholar): Awarded 2022

UW Provost Fellowship: Awarded 2021

MIT Math Teaching & Learning Award: Awarded 2021

MIT Alan Brody Prize: Awarded 2021

International Linguistics Olympiad: Silver medal, rank 13th, awarded 2016