

# NELSON SHUHENG NIU

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

## EDUCATION

University of Washington, Seattle, WA – Doctoral Student in Mathematics, Ongoing

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

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

## PREPRINTS AND WORKS IN PROGRESS

Nelson Niu and David I. Spivak. *Polynomial Functors: A General Theory of Interaction*. URL: <https://topos.site/poly-book.pdf>

Joseph Dorta, Samantha Jarvis, and Nelson Niu. *Monoidal structures on generalized polynomial categories*. May 2023. [arXiv:2305.05655](https://arxiv.org/abs/2305.05655) [math.CT]

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>

Tanya Khovanova and Shuheng Niu. *m-Modular Wythoff*. Aug. 2016. [arXiv:1608.01025](https://arxiv.org/abs/1608.01025) [math.CO].

## 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

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

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

Book: *Seven Sketches in Compositionality: An Invitation to Applied Category Theory* by Brendan Fong

& David Spivak

Supervisor: Bobby Wilson

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

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

TUTOR, UW MATHEMATICS DEPARTMENT – MAR-JUN '23

Program: Math Major Study Hall

Supervisor: Jennifer Taggart

TEACHING ASSISTANT, UW MATHEMATICS DEPARTMENT – SEP-DEC '21, JUN-DEC '22, SEP '23-PRESENT

Classes: MATH 125 Calculus with Analytic Geometry II; MATH 126 Calculus with Analytic Geometry III

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

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 – FEB '23-PRESENT

Position: Academic Student Employee Union Steward

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++, Coq, LaTeX, Haskell, Idris, Agda, Mathematica

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

## **AWARDS & HONORS**

UW Math Excellence in Teaching Award: 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