Apurva Nakade

Department of Mathematics, Northwestern University.
apurva.nakade@northwestern.edu
apurvanakade.github.io

Experience

Postdoctoral Lecturer, Northwestern University	2021-
Postdoctoral Fellow, University of Western Ontario	2019-21
Ph.D. in Mathematics, Johns Hopkins University	2019
M.Sc. in Mathematics, Chennai Mathematical Institute	2013
Exotic Derivatives Trader, Nomura Capital India Pvt Ltd	2010
B.Tech. in Computer Science & Engineering, IIT Kanpur	2010

Publications

String structures, 2-group bundles, and a categorification of the Freed-Quinn line bundle 2021
arXiv:2110.07571, joint with D. Berwick-Evans, E. Cliff, L. Murray, and E. Phillips

Manifold Calculus and the h-principle 2019
The Journal of Homotopy and Related Structures

Effect of increasing the energy gap between the two lowest energy states on the mixing time of the Metropolis algorithm (with Somenath Biswas) 2012
Information Processing Letters, IPL4801 (2012.08.012)

Grants & Awards

Open Educational Resources Faculty Grant 2022
$5000 to develop, use, and publish OER for a Northwestern undergraduate course

William Kelso Morrill Award for Excellence in Mathematics, JHU 2019
Awarded each year to the graduate student who best displays love of teaching, love of mathematics, and concern for students

Finalist for the *KSAS Excellence in Teaching Awards* 2019
The award honors the best graduate TAs in the School of Arts and Sciences for the care and concern they take with their subject and their students.

Prof. Joel Dean Award for Excellence in Teaching in Mathematics, JHU 2016
Annual award to recognize graduate students who have exhibited extraordinary performance in teaching undergraduates

AMS Graduate Student Travel Grant 2019
$250 travel grant for giving a talk at AMS Sectional Meetings

Mentoring

Supplementary instructor for the *Causeway Postbaccalaureate Program* 2022
Yearlong experience in mathematics that seeks to increase the number of graduate students in the mathematical sciences from historically underrepresented groups

Co-coordinator for *Northwestern Emerging Scholars Program* 2022
Weekly sessions led by upper-class peers involving problem-solving and discussion centered on hand-picked advanced mathematical topics

Directed Reading Program 2017-21

- Started DRP at UWO in Fall 2019
- Organizer and mentor for DRP at JHU and UWO

Professional Development

MAA Project NExT Fellow, Brown'20 cohort — 2020
Professional development program for new or recent Ph.D.s in the mathematical sciences.

Teaching Academy Certification, JHU — 2019
Program to help prepare for academic careers and to provide assistance in acquiring a foundation for the teaching responsibilities

Participated in several workshops by the *Center of Teaching & Learning* at UWO — 2019-20
Participated in the MSRI *Critical Issues in Mathematics Education Workshop* — 2022
Participated in the MAA *Modeling Inspiration for Differential Equations Workshop* — 2022
Participated in online *Mastery Grading Workshop* — 2019
Attended the *Science of Learning Symposium*, JHU — 2014-18

Teaching Experience

Instructor, Northwestern — 2021-
- MENU Linear Algebra and Multivariable Calculus, (Coordinator) 2022-23
- Introduction to Optimization, Winter, Spring 2022
- Single Variable Calculus, Fall 2021
- MENU Linear Algebra and Multivariable Calculus, 2021-22
- Foundations of Mathematics, Winter 2023
- Elementary Differential Equations, Spring 2023

Instructor, UWO — 2019-21
- Algebraic Topology (graduate level), Winter 2021
- Topology Bootcamp, Fall 2020
- Discrete Structures for Engineering, Fall 2020
- Calculus II for Mathematical and Physical Sciences, Winter 2020
- Calculus I for Mathematical and Physical Sciences, Fall 2020
- Topics in Category Theory, Fall 2020

Instructor, JHU — 2014-18
- Honors Single Variable Calculus, Fall 2018, 2017
- Symmetries & Polynomials, Intersession 2018
- Hitchhikers Guide to Algebraic Topology, Intersession 2017
- Differential Equations with Applications, Summer 2017, 2015
- Online Linear Algebra, Summer 2014

Academic Co-coordinator, Canada/USA Mathcamp — 2018
- Planned the five week academic schedule
- Part of the mentor hiring committee
- Invited visiting speakers

Mentor/Staff, Canada/USA Mathcamp — 2017-20
- Designed and taught a variety of undergraduate-level courses
- Was residential and academic advisor at camp
- Part of the mentor hiring committee

Projects

Formalizing Math in *Lean Theorem Prover* 2019-

- Taught a course at Mathcamp 2020
- Contributed to Lean's surreal numbers math library
- Contributed to Lean's convex optimization math library

Open Educational Resources Textbook for Linear Algebra 2022

- Added WeBWorK problems to a Linear Algebra *PreTeXt* OER textbook

Course Design: *Introduction to Optimization*, UWO 2022

- Restructured the course to include applications and modeling
- Created *course notes* in *RMarkdown*
- Created Excel worksheet assignments for modeling scenarios

Course Design: *Discrete Structures for Engineering*, UWO 2020

- Adapted the course for online asynchronous delivery
- Helped code (in a team) hundreds of problems on WeBWork
- Made short weekly video lectures to support the course text
- Maintained an active discussion forum on Piazza
- Gave a talk about the course design at a conference on E-Assessment in Mathematical Sciences

Course Design: *Honors Single Variable Course (IBL)*, JHU 2017-18

- Designed and taught a semester long course structured in a flipped classroom format for two semesters

Course Design: *Intersession courses*, JHU 2017-18

- Designed and taught a 2-week course titled *Symmetries & Polynomials* introducing Galois theory to non-math majors
- Designed and taught a 2-week course *Hitchhiker's Guide to Algebraic Topology* introducing algebraic topology to non-math majors

Course Design: *Canada/USA Mathcamp courses* 2017

- Designed and taught several week-long math courses to advanced high-school students
- Course topics: Theorem proving in Lean, Visualizing 3-manifolds, Riemann surfaces, Crash Course on Linear Algebra, Covering Spaces, Cohomology etc.