Keshav B. Patel
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Education

University Utah   Expected May 2024
- Ph.D. in Mathematics

University of North Carolina at Chapel Hill   May 2019
- B.S. in Biomedical and Health Sciences Engineering
  - UNC/NC State University Joint Department
- B.S. with Highest Honors in Mathematics: Applied Option
- Minor in Chemistry
- Graduated with Highest Distinction

North Carolina School of Science and Mathematics   June 2015

Publications and Presentations

Publications
- **Patel, K. B.**, Mao, S., Forest, M. G., Lai, S. K., Newby, J. M. 2019. Limited Processivity of Single Motors Improves Motor Transport Through Enhanced Loading of Multi-Motor-Cargo Complexes on Microtubules. *Physical Review E.* 100 (2).

Publications (in progress)
- **Patel, K. B.**, Bergmeier, W., Fogelson, A. L. 2022. Modeling Platelet P2Y1/12 Pathway Within Near-membrane Nanodomains.
- Wessler, T, **Patel, K. B.**, Newby, J. M., Forest, M. G., Lai, S. K. 2022. Rapid Binding Interactions Between Antibodies and Mucin Overcome Large-scale Dynamics Leading to Increased HIV Infection.

Undergraduate Honors Thesis
- **Patel, K. B.** 2019. Optimization of Crosslinker Efficiencies Through Asymptotic Approximation and Simulation of Fick's Law Systems. *University of North Carolina at Chapel Hill*

Oral Presentations
- **Patel, K. B.** (November 2018). Maximizing Flux Along Microtubule via Cooperation Among Molecular Motors. In M. Ayewoh (Chair). *Annual Biomedical Research Conference for Minority Students.* Conducted from Indianapolis, IN
- **Patel, K. B.** (September 2018). Maximizing Flux Along Microtubule via Cooperation Among Molecular Motors. In T. Freeman (Organizer). *Chancellor's Science Scholars Research Symposium.* Conducted from Chapel Hill, NC
- **Patel, K. B.** (August 2018). Maximizing Flux Along Microtubule via Cooperation Among Molecular Motors. In T. Nance (Organizer). *Mathematical Biosciences Institute Summer Capstone.* Conducted from Columbus, OH

Poster Presentations
- **Patel, K. B.** (July 2022). Modeling Platelet P2Y1/12 Pathway Within Near-membrane Nanodomains. *Gordon Research Conference – Hemostasis*, Waterville Valley, NH
- **Patel, K. B.** (August 2018). Maximizing Flux Along Microtubule via Cooperation Among Molecular Motors. *Mathematical Biosciences Institute Summer Capstone*, Columbus, OH

Awards and Honors
- Center for Quantitative Biology Fellowship Recipient   August 2019
- Honors Carolina Graduate   May 2019
- National Science Foundation Graduate Research Fellow Recipient   April 2019
- Univ. North Carolina Chancellor's Science Scholars Distinguished Scholar   August 2018

Service and Outreach
- Chair — Association for Women in Mathematics Speaker Series   Aug 2021 - present
    - Invite and host mathematicians from underrepresented groups to department
- Co-chair — Graduate Student Advisory Committee   Aug 2021 - Aug 2022
    - Liason between graduate students and department
- Chair — Graduate Student Recruitment Weekend Committee   Mar 2022
    - Organized and ran virtual and in-person visits for prospective graduate students
- Co-organizer — Essentials of Math Modeling Workshop Series   Jan 2022 - Feb 2022
    - In partnership with SIAM and Mathworks
- Co-organizer — High School Mathematical Modeling Workshop Series   Sept 2021 - Nov 2021
- Co-chair — Graduate Student Recruitment Weekend Committee   Mar 2021

Mentorship
- Directed Reading Program   Aug 2021 - present
    - Finite Difference Methods for Ordinary and Partial Differential Equations (LeVeque 2007)

Programming Skills
- Programming/Markup: C, Python, Java, Matlab, R, LaTeX (IDE and UNIX environment experience)
- Manufacturing and Electronics: Solidworks, Labview, Multisim

Undergraduate Research Experience

Wesley Legant Research Group (Chapel Hill, NC)

Research Assistant   July 2018 - July 2019
- Creating Finite Element Analysis program in COMSOL to generate Green's matrix of material deformations given application of loads
- Solving inverse problem to compute forces exerted on a material given displacements in 3-D images
- Analyzing result errors to determine most efficient computational parameters that solve within a given tolerance

Nancy Rodriguez Research Group (Chapel Hill, NC)

Research Assistant   May 2018 - Present
- Matching partial differential equation model for gentrification of an area over time to US Census data
- Utilizing maximum likelihood estimation to determine optimum model parameter values
- Gathering and manipulating data in R and Matlab to describe wealth distribution over a geography
- Presenting current work in group meetings

Sam Lai/Greg Forest Research Group (Chapel Hill, NC)

Research Assistant   August 2015 - Present
- Studying the interactions between antibodies and HIV virions within vaginal mucus layer using one dimensional partial differential equation model in Matlab
- Programming in Matlab to simulate physical system using various parameters
- Concluding that varying affinity of antibodies to mucus affects trapping capabilities of immune system
- Conducting independent project on molecular motor dynamics in cells
- Solving equations analytically and comparing to computational solution
- Creating and organizing plots and figures to present to group

Research Mentor   October 2017 - May 2019
- Teaching high school and undergraduate student background knowledge necessary for Applied Mathematics research
- Organizing projects for mentees to acclimate to models of physical systems
- Creating and organizing written progress reports