

# Karen Medlin

PH.D. CANDIDATE IN APPLIED MATHEMATICS

University of North Carolina at Chapel Hill  
Mathematics Department  
120 East Cameron Avenue  
Chapel Hill, NC 27599  
[kmedlin@unc.edu](mailto:kmedlin@unc.edu) | [karenamedlin@gmail.com](mailto:karenamedlin@gmail.com)  
<https://sites.google.com/view/kmedlin>  
(404) 403-7940

---

## EDUCATION

**University of North Carolina at Chapel Hill**, Chapel Hill, NC  
Ph.D. Applied Mathematics (M.S. in Mathematics, 2022) 2019 - 2025 (expected)  
Co-advisors: Greg Forest, Krishnan Raghavan <sup>1</sup>

- Dissertation research: Drawing on ideas from probability theory, developing new ML tools to extract predictive capabilities from a type of data common to today's datasets – called “imbalanced data.” As a U.S. Department of Energy Graduate Student Research (SCGSR) Awardee and in collaboration with physicists at Argonne National Lab, customizing these tools to predict rare subatomic events detected by the ATLAS particle accelerator.
- Courses: algorithms, data structures, machine learning, numerical linear algebra, optimization, probability, scientific computing, and statistical modeling

**IBM Research Summer School on Sketching and Tensor Algebra**, San Jose, CA  
Collaboration between IBM and Mathematical Sciences Research Institute (MSRI) July 2023

**University of Washington**, Seattle, WA  
Masters degree coursework in Mathematics 2018 - 2019

**City University of New York**, New York, NY  
Post-baccalaureate coursework in Mathematics 2014 - 2018

---

## SKILLS

**Programming Languages:** Java, Python, R, Shell scripting  
**Python Libraries:** Matplotlib, Numpy, Pandas, PyTorch  
**Communications:** Grant writing

---

## AWARDS & CERTIFICATES

**U.S. Department of Energy Office of Science SCGSR Award** 2023 - 2024  
**UNC ARPA Graduate Degree Completion Grant** 2021 - 2022  
**Introduction to High Performance Computing (HPC) Certificate** Nov. 2022  
Super Computing Conference (SC22)  
**Certificate in Data Science** Summer 2018  
Principal Analytics Prep *Harvard Business School Startup Studio*

---

## WORK EXPERIENCE

**Graduate Research Assistant** 2019 - present  
UNC Chapel Hill Mathematics Department

- Currently developing algorithms to improve the classification of imbalanced data.
- Working in Python and Git and running code on a Linux-based supercomputer.

**National Science Foundation Math Sciences Graduate Intern** Summers 2022 & 2023  
Argonne National Laboratory

- Began what became my dissertation research on the classification of imbalanced data during a summer internship in Argonne's Mathematics and Computer Science Division.
- Developed code in Python with PyTorch library.

<sup>1</sup> Assistant Computational Mathematician Dr. Krishnan Raghavan works at Argonne National Laboratory.

**Senior Grants Manager**

2012 - 2017

The Joyce Theater Foundation, Inc., New York, NY

- Exceeded fundraising targets year over year for an operational budget of \$10+ million. Increased annual contributed income by \$1 million (50%) over five years.
- Daily workflow and donor pipeline in a SQL-based database.

**TEACHING  
EXPERIENCE****Recitation Leader**

- Math 233: Calculus III, UNC Chapel Hill Fall 2023
- Math 232: Calculus II, UNC Chapel Hill Spring 2023
- Math 125: Calculus II, Univ. Washington Fall 2018, Winter 2019, Spring 2019

**INVOLVEMENT****Graduate Mathematics Association**

2019 - present

UNC Chapel Hill Mathematics Department

- Treasurer, 2021-2022

**Society for Industrial and Applied Mathematics**

2019 - present

- National Math Festival Volunteer, 2021

**Super Computing Conference**

Nov. 2022 &amp; 2023

- Student Volunteer at SC22 in Dallas and SC23 in Denver

**Anti-Racism Community Group (ARC)**

2020 - 2022

UNC Chapel Hill Mathematics Department

- Founder and Organizer

**PRESENTATIONS  
& PUBLICATIONS****Paper**

(in progress)

“PLEUM: Performance-driven Learning and Exploratory Undersampling”

**Paper**

(in review)

“Global Sensitivity Analysis of the Onset of Nasal Passage Infection by SARS-CoV-2 With Respect to Heterogeneity in Host Physiology and Host Cell-Virus Kinetic Interactions,” *Virus*, General Virology: Mathematical Modeling of Viral Infection.

**Triangle Computational and Applied Mathematics Symposium(TriCAM)** Sept. 2022

North Carolina State University

Lightning Talk and Poster: To Classify Imbalanced Data Correctly, Find the Best ~~Model~~ Data**Paper**

Dec. 2021

“Maximum Covering Subtrees for Phylogenetic Networks,” *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, 18(6): 2823-2827, DOI:10.1109/TCBB.2020.3040910.

**Underrepresented Students in Topology and Algebra Symposium**

Apr. 2018

Reed College

Poster presentation: Neural Networks and the Shape of Data

**Joint Mathematics Meeting (JMM)**

Jan. 2017

Atlanta

Poster: The Perceptron: An Introduction to Machine Learning