Carole Hall

carole.hall@stonybrook.edu

EDUCATION:

- **Stony Brook University,** Stony Brook, NY

  Applied Mathematics and Statistics: August 2020 - May 2026 (expected)

  Computational Biology, PhD.

- **University of Minnesota, Twin Cities,** Minneapolis, MN

  Mathematical Biology: Genomics, B.S. September 2016 - May 2020

SKILLS:

- Python (Scikit-Learn, Pandas, PyTorch, Geopandas), R, MATLAB, C++, SQL
- Machine learning, GIS and spatial statistics, functional data analysis, data science, statistical modeling, computer vision, HPC.
- ArcGIS, QGIS.
- Git
- Excellent written and oral communication skills, LaTeX document preparation system.

WORK & RESEARCH EXPERIENCE:

- **Sandia National Laboratories,** Albuquerque, NM

  Statistical Sciences Graduate Intern June 2023 - Present

  - Research analytical methods in statistical shape analysis and computer vision.
  - Apply functional data analysis methods to large and complex collections of climate data.
  - Create forecasting algorithms for spatially-dependent climate data.
  - Implement machine learning and deep learning techniques on image data.
  - Collaborate with researchers from other national labs on security and scientific problems.
  - Develop software in R, Python, and MATLAB languages.

- **Stony Brook University,** Stony Brook, NY

  Research Assistant to Dr. Heather Lynch November 2020 - Present

  - Perform NASA-funded research spanning across multiple disciplines.
  - Process satellite imagery and drone imagery over a variety of high and low resolutions.
  - Analyze movement data using shape modeling tools and agent-based modeling.
  - Visualize and edit geospatial data using ArcGIS, QGIS, and Python (GeoPandas, ArcPy).
  - Collaborate with professionals across a variety of scientific fields including climate, ecology, computer science, and biology and a variety of federal agencies.
  - Travel to Antarctica to perform fieldwork and work on ships.

- **National Institute of Standards and Technology,** Gaithersburg, MD

  Guest Researcher May 2022 - June 2024

- Collaborate with imaging scientists on current Ph.D. research.
- Implement image analysis and computer vision techniques in Python and MATLAB.
- Perform processing on geospatial shapefile datasets using Geopandas and ArcPy.
- Study applications of shape modeling such as ecology and climate science.

- **Quark Expeditions,** Ushuaia, Tierra del Fuego, Argentina

  Research Scientist with PenguinWatch November 2022 - December 2022

  - Collaborated with Dr. Tom Hart from Oxford University on penguin colony research.
  - Collected guano samples, flew drones, upkept trail cameras.
  - Gave lectures and educated ship passengers on Antarctic ecology.
  - Assisted with setting up campsites, biosecurity and disinfection, safety drills.

- **Aptima,** Woburn, MA

  Data Scientist Intern June 2021 - August 2021

  - Implemented methods for studying motion and biometric data in Python.
  - Performed speech recognition, sentiment analysis in Python.
  - Researched social network analysis methods to study team cooperation.
  - Analyzed large and noisy datasets.

- **Fox Chase Cancer Center,** Philadelphia, PA

  Research Assistant to Dr. Andrew J. Andrews June 2020 - August 2020

  - Modeled and simulated enzyme-catalyzed reactions using MATLAB/Python.
  - Analyzed and interpreted data using statistical and machine learning methods.

- **University of Minnesota,** Minneapolis, MN

  Teaching Assistant to Dr. Duane Nykamp September 2019 - December 2019

  - Taught students to model biological processes using dynamical systems.
  - Aided students in understanding calculus concepts applied to the life sciences.
  - Helped students with homework assignments and project creation.

- **Fox Chase Cancer Center,** Philadelphia, PA

  Undergraduate Research Fellow to Dr. Andrew J. Andrews June 2019 - August 2019

  - Simulated enzyme-catalyzed reactions in Python.
  - Researched machine learning methods such as SVM, PCA, and regression.
  - Wrote progress reports, created presentations.

- **Rose: Smarter Mental Health,** New York, NY

  Machine Learning Intern September 2018 - May 2019

  - Assisted in building a healthcare tech start-up from the ground up.
  - Helped value the company at over $2 million during employment.
  - Built machine and deep learning models for sentiment analysis, large dataset analysis using MATLAB and Python..

- Analyzed and prepared large sets of labeled and unlabeled data.
- Used AWS for database creation and maintenance.

- **University of Minnesota,** Minneapolis, MN

  Teaching Assistant in the Math Center for Educational Programs September 2018 - May 2020

  - Taught advanced mathematics topics to middle and high school students during the week.
  - Ran weekend activities to engage students in the area to applications of mathematics.
  - Graded homework and exams, prepared paperwork, and interacted with parents.

- **University of Minnesota,** Minneapolis, MN

  Undergraduate Researcher in Combinatorics/Number Theory January 2018 - December 2019

  - Prepared weekly presentations, attended conferences, and recorded work in publications.

ACTIVITIES & SOCIETIES

- **International Pals Program,** Stony Brook University

  Mentor September 2023 - Present

- **Heather Lynch Lab,** Stony Brook University

  Research Mentor June 2023 - Present

- **SIAM Student Chapter,** Stony Brook University

  President October 2022 - Present

- **Minnesota Undergraduate Research & Academic Journal,** University of Minnesota

  Managing Editor, Treasurer September 2018 - May 2020

HONORS & AWARDS

- Institute for Advanced Computational Science (IACS) Junior Researcher Fellowship Award Renewal (2023-2024).
- Society for Industrial and Applied Mathematics (SIAM) Award for Outstanding Service in Development of the Stony Brook Student Chapter (2023).
- Stony Brook University Applied Mathematics and Statistics Department Special Award for Outstanding Service (2023).
- Society for Industrial and Applied Mathematics (SIAM) Travel Award (2023).
- Institute for Advanced Computational Science (IACS) Junior Researcher Fellowship Award (2022-2023).
- Society for Industrial and Applied Mathematics (SIAM) Travel Award (2022).
- Mathematical Association of American Outstanding Poster Award (2019).

PUBLICATIONS & APPEARANCES:

- Hall, Carole & Tucker, J. Derek. (2025 July). " From Shapes to Shifts: An Elastic Framework for Detecting Changepoints in Animal Movement". Talk presented at the Society for Industrial and Applied Mathematics (SIAM) Conference on Computational Geometric Design (GD25). Montreal, Québec, Canada.
- Wu, Haoyu & Flynn, Clare & Hall, Carole & Che-Castaldo, Christian & Schwaller, Mathew & Lynch, Heather. (2024). Penguin colony georegistration using camera pose estimation and phototourism. *PLOS ONE*. 19. 10.1371/journal.pone.0311038.

- Hall, Carole. (2023 June). “From Pixels to Penguins: Analyzing Long-term Adélie Colony Dynamics Through Super-resolution of Satellite Imagery”. Talk presented at the POLE Seminar at Woods Hole Oceanographic Institute, Woods Hole, Massachusetts.
- Hall, Carole, et al. (2023 May). “From Pixels to Penguins: Analyzing Long-term Adélie Colony Dynamics Using Landsat Imagery”. Talk presented at the NASA Carbon Cycles & Ecosystems Joint Science Workshop, College Park, Maryland.
- Hall, Carole. (2023 February). “The Physics of Penguins: Super-Resolving Imagery of Adélie Penguin Colonies”. Talk presented at the Society for Industrial and Applied Mathematics (SIAM) Computational Science and Engineering Conference, Amsterdam, The Netherlands.
- Hall, Carole. (2022 July). “Modeling the Spatial Aggregation of Adélie Penguins”. Talk presented at the Society for Industrial and Applied Mathematics (SIAM) Mathematics of Planet Earth Conference, Pittsburgh, PA.
- Hall, Carole. (2022 March). “How the complexity of Adélie penguin colony shape relates to the chance of colony collapse”. Talk presented at the Aspen Center for Physics Conference on the Dynamics of Social Interactions, Aspen, CO.
- Adams, Ashleigh & Hall, Carole. (2019, January). “Simplicial Complexes of Zero-Sumfree Sets”. Poster session presented at the Mathematics Association of America Undergraduate Poster Session, Baltimore, MD.
- Adams, Ashleigh & Hall, Carole. (2018, October). “Simplicial Complexes of Zero-Sumfree Sets”. Talk presented at the Midwest Conference on Combinatorics and Combinatorial Computing, Duluth, MN.
- Adams, Ashleigh & Hall, Carole. (2018, August). “Simplicial Complexes of Zero-Sumfree Sets”. Poster session presented at the 2018 Summer Undergraduate Research Symposium, Minneapolis, MN.
- Adams, A., Hall, C., & Stucky, E. (2019). Classifications of ℓ-Zero-Sumfree Sets. *The PUMP Journal of Undergraduate Research*, *2*, 179-198. Retrieved from https://journals.calstate.edu/pump/article/view/1805.