Katherine J. Pearce

NSF MPS-ASCEND Postdoctoral Fellow

Research Interests

Randomized numerical linear algebra; mathematical modeling; parameter identifiability analysis.

Education

Aug 2017 - May 2022 **North Carolina State University, Raleigh, NC**, *Ph.D.*, *Applied Mathematics*.
"Methods for Parameter Identifiability Analysis of Dynamical Systems with Applications to Data-Driven Models."
Research Advisor: Mansoor Haider

2014 - 2016 **University of Denver, Denver, CO**, *M.S.*, *Mathematics*.

2009 - 2013 **University of Texas, Austin, TX**, *B.S.*, *Mathematics*.

2009 - 2013 **University of Texas, Austin, TX**, *B.A.*, *English Literature*.

Fellowships and Awards

Sep 2024 **MPS-ASCEND Postdoctoral Research Fellow**, *National Science Foundation*, The University of Texas at Austin.
Award No. 2401889, Award Amount: $300,000; working under mentorship of Dr. Per-Gunnar Martinsson

Sep 2022 - Aug 2024 **Peter O'Donnell Jr. Postdoctoral Research Fellowship**, *Oden Institute*, The University of Texas at Austin.
1 of 5 postdoctoral fellows for 2022-2024; working with Dr. Per-Gunnar Martinsson

May 2022 **Winton-Rose Research Award**, North Carolina State University.
Recipient of annual departmental research award

Spring 2022 **AAAS Mass Media Fellowship Semi-finalist**.
Semi-finalist for science communication training and placement with participating national media organization.

Spring 2020* **AMS Catalyzing Advocacy in Science and Engineering (CASE) Fellowship**.
1 of 2 students nationwide to receive annual award (*DC in-person event postponed to Sep 2021 due to COVID-19).

Summer 2020 **NC State Graduate School Summer Fellowship**.
Awarded by the Graduate School for excellent degree progress.

Publications

- K.J. Pearce and P.-G. Martinsson (2026). "Randomized Numerical Linear Algebra for Low-Rank Matrix and Tensor Approximation," in preparation for *Lecture Notes in Computational Science and Engineering*.
- K.J. Pearce, A. Yesypenko, J. Levitt, and P.-G. Martinsson (in review). "Randomized Block Low-Rank Matrix Compression by Tagging," *SIAM Journal on Matrix Analysis and Applications*, arXiv:2501.05528 [math.NA].
- K.J. Pearce, C. Chen, Y. Dong, and P.-G. Martinsson (2025). "Adaptive Parallelizable Algorithms for Interpolative Decompositions via Partially Pivoted LU," *Numerical Linear Algebra with Applications*, 32: e70002.
- Y. Dong, C. Chen, P.-G. Martinsson, and K.J. Pearce (2025). "Robust Blockwise Random Pivoting: Fast and Accurate Adaptive Interpolative Decomposition," to appear in *SIAM Journal on Matrix Analysis and Applications*.
- K.J. Pearce (2024). "Extreme cases: Math education within the U.S. prison system," *Notices of the American Mathematical Society*.
- M.A. Haider, K.J. Pearce, N.C. Chesler, N.A. Hill, M.S. Olufsen (2023). "Application and reduction of a nonlinear hyperelastic wall model capturing ex vivo relationships between fluid pressure, area and wall thickness in normal and hypertensive murine left pulmonary arteries," *International Journal for Numerical Methods in Biomedical Engineering*, 40(3):e3798.
- K.J. Pearce, A.K. Saibaba, M.A. Haider, R.C. Smith, and I.C.F. Ipsen (2022). "Robust Parameter Identifiability Analysis via Column Subset Selection," arXiv preprint arXiv:2205.04203 [math.NA].
- K.J. Pearce, K. Nellenbach, R.C. Smith, A.C. Brown, M.A. Haider (2021). "Modeling and parameter subset selection for fibrin polymerization kinetics with applications to wound healing," *Bulletin of Mathematical Biology*, 83(47):1-22.
- L. Lazarino, K.J. Pearce, N. Pritchard, Y. Nakatsukasa (in preparation). "Efficient Error Estimation for Iterative Black-box CUR Factorizations."

Invited Talks, Panels, and Presentations

- SIAM AN 25: *Randomized Compression of Rank-Structured Matrices*, Session Chair of Advances in Computational Science, Montreal, Canada, July 2025.
- SIAM CSE 25: *Randomized Compression by Tagging*, Speaker and Organizer of RandNLA: Algorithms for Scientific Computing Minisymposium, Ft. Worth, Texas, March 2025.

- JMM 25: *The Mathematics of Mass Incarceration*, Panelist, Seattle, Washington, January 2025.
- JMM 25: *Randomized Compression by Tagging*, ILAS Special Session on Randomness in Numerical Linear Algebra, Seattle, Washington, January 2025.
- SIAM LA 24: *Efficient Randomized Sampling by Tagging for Rank-Structured Matrix Compression*, RandNLA: From Theory to Practice Minisymposium, Paris, France, May 2024.
- Prospective Faculty Weekend 24: *Randomized Algorithms for Low-Rank Matrix Approximation*, Notre Dame University, South Bend, Indiana, May 2024.
- SIAM UQ 24: *Randomized Sampling for Rank-Structured Matrix Compression*, Randomized Algorithms for Uncertainty Quantification Minisymposium, Trieste, Italy, February 2024.
- SIAM UQ 24: *Mitigating Uncertainty: Math Education in U.S. Prisons*, Power of Diversity Session, Trieste, Italy, February 2024.
- ICIAM 23: *Error Estimation in Randomized Algorithms for Rank-Revealing Factorizations*, Randomized numerical linear algebra minisymposium, Tokyo, Japan, August 2023.
- JMM 22: *AMS Advocacy for Mathematics & Science Policy*, Panelist, Seattle, WA, January 2022.
- Triangle Area Graduate Mathematics Conference (TAGMaC 21): *Mathematical models and parameter subset selection techniques for fibrin matrix polymerization*, Duke University, November 2021.
- paraDIGMS Fall 2021: *Institutional Student Support and Retention in Mathematics Graduate Programs and Beyond* , Diversity Committees, October 2021.
- Society for Mathematical Biology Annual Meeting 21: *Modeling and parameter subset selection for fibrin polymerization kinetics in wound healing*, Methods for Biological Modeling Minisymposium, Online, June 2021.
- SAMSI Numerical Analysis in Data Science Transition Meeting: *Mathematical models and parameter subset selection techniques*, Duke University, Online, June 2021.
- SAMSI Seminar: *Mathematical modeling of the COVID-19 Pandemic*, Undergraduate Modeling Workshop, Online, June 2021.
- SAMSI Seminar: *Mathematical models and parameter subset selection techniques for fibrin matrix polymerization*, Online, February 2021.
- Triangle Area Graduate Mathematics Conference (TAGMaC 20): *HGO-based mathematical modeling of pulmonary hypertension*, University of North Carolina at Chapel Hill, December 2020.
- AFRL Repperger Closing Ceremony 19: *Network Measure Frameworks for Topological Data Analysis*, Air Force Research Lab, Wright-Patterson Air Force Base, Ohio, August 2019.
- AWM 18: *Multipolynomial Resultants and the Sylvester Matrix*, University of North Carolina at Chapel Hill, February 2018.

Invited Workshops

- Simons Institute for the Theory of Computing, Complexity and Linear Algebra Workshop: *Linear Systems and Eigenvalue Problems*, New York, New Work, October 2025.
- UCLA Research Collaboration Workshop: *Randomized Numerical Linear Algebra*, Los Angeles, California, August 2025.
- Mathematical Association of America, *The Harmony of Compassion and Rigor in Mathematical Spaces*, July 2025 - Jan 2026.

Teaching Experience

Instructor of Record

Spring 2025 **Differential and Integral Calculus for Business (M 408Q)**, UT Austin, Department of Mathematics.
Spring 2025 **Discrete Mathematics (M 325K)**, UT Austin, Texas Prison Education Initiative.
Fall 2024 **Preparation for Calculus (M 305G)**, UT Austin, Texas Prison Education Initiative.
Summer 2024 **The Art of Mathematics**, UT Austin, Texas Prison Education Initiative.
Spring 2024 **Preparation for Calculus (M 305G)**, UT Austin, Texas Prison Education Initiative.
Fall 2023 **Preparation for Calculus (M 305G)**, UT Austin, Texas Prison Education Initiative.
Summer 2023 **The Art of Mathematics**, UT Austin, Texas Prison Education Initiative.
Spring 2023 **Algebra (College Prep)** , UT Austin, Texas Prison Education Initiative.
Spring 2020 **Calculus 3 (M 242)**, North Carolina State University.
Fall 2019 **Calculus 2 (M 241)**, North Carolina State University.

Recitation Leader

Fall 2018 **Calculus 2**, North Carolina State University.
Winter 2017 **Differential Equations**, University of Denver.

Fall 2016 **Linear Algebra**, University of Denver.
Winter 2016 **Calculus 2**, University of Denver.
Fall 2015 **Calculus 1**, University of Denver.
Spring 2015 **Business Calculus**, University of Denver.
Winter 2015 **Business Calculus**, University of Denver.

Lecture Assistant

Spring 2019 **Algebra and Trigonometry**, North Carolina State University.
Fall 2017 **Precalculus I**, North Carolina State University.
Spring 2016 **Graph Theory for Non-Math Majors**, University of Denver.

Service

Graduate and Postdoctoral Women of the Oden Institute, *The University of Texas at Austin*.
2025-26 Chair

SIAM Journal on Matrix Analysis and Applications.
Reviewer

SODA 25, *ACM-SIAM Symposium on Discrete Algorithms*.
Reviewer

National Postdoctoral Association, *The University of Texas at Austin*.
Co-chair and co-founder of UT Austin Chapter

Texas Prison Education Initiative (TPEI), *The University of Texas at Austin*.
Volunteer instructor of university mathematics courses at local women's prison

Graduate Resource Teaching Assistantship, *North Carolina State University*.
Co-creator of new TA position and graduate course curriculum to support first year math grad students.

Diversity, Equity, and Inclusion (DEI) Committee, *North Carolina State University*.
Founding member of math faculty and graduate student departmental committee to create and continue DEI initiatives.

Undergrads Union Grads (UUG), *North Carolina State University*.
Mentor to undergraduate mathematics students interested in attending graduate school.

SAMSI Undergraduate Modeling Project, *North Carolina State University*.
Co-organized workshop for undergraduate students on mathematical modeling of the COVID-19 pandemic, May 2021.

Association for Women in Mathematics (AWM), *University of Denver*.
President and co-founder of DU Chapter.

Relevant Skills

Programming MATLAB, Python, Maple, R
Software HPC, LaTeX, Ayasdi
Communication Technical writing and editing, public speaking, interdisciplinary collaboration

Certifications and Trainings

- Modern Workplace and Managing Bias Training
- QPR+ Suicide Prevention Training
- Creating an Academic Continuity Plan Training
- First Amendment and DEI Impact Response Seminar
- edX Inclusive STEM Teaching Certificate
- How to Create an Inclusive Classroom Seminar
- Creating an Effective Lecture Video Seminar
- Identifying Learning Objectives for Your Course Seminar

Memberships and Affiliations

- American Mathematical Society (AMS)
- Society for Mathematical Biology (SMB)
- Local Science Engagement Network (AAAS)
- Association for Women in Mathematics (AWM)
- Society for Industrial and Applied Mathematics (SIAM)
- Texas Exes Hispanic Alumni Network

Work Experience

Sep 2022 - Present **Postdoctoral Research Fellow**, Oden Institute for Computational Engineering and Sciences, TX.
Aug 2020 - May 2022 **Graduate Research Assistant**, Statistical and Applied Mathematical Sciences Institute, NC.

Aug 2019 - May 2020 **Instructor of Record**, North Carolina State University, NC.

May 2019 - Aug 2019 **Repperger Intern**, Air Force Research Laboratory, Wright-Patterson AFB.

Sep 2017 - May 2019 **Graduate Teaching Assistant**, North Carolina State University, NC.

Sep 2014 - Mar 2017 **Graduate Teaching Assistant**, University of Denver, CO.

Jun 2013 - Aug 2014 **Mathematics Instructor**, Mathnasium, Austin, TX.

May 2012 - Aug 2012 **Data Analytics Intern**, Pervasive Software, Austin, TX.