Leigh Bennett Pearcy

NSF Graduate Research Fellow

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EDUCATION

Ph.D. in Mathematics, concentration in Mathematical Biology — August 2018 – May 2023
The University of Tennessee, Knoxville (UT), *Knoxville, TN*

Advisor: Dr. W. Christopher Strickland
Dissertation: Modeling Substance Use Disorder using Deterministic and Stochastic Approaches and A Bayesian Model of Sudden Death

Master of Science in Statistics — August 2018 – May 2023
UT, *Knoxville, TN*

Bachelor of Science in Mathematics — August 2014 – May 2018
The University of North Carolina (UNC), *Chapel Hill, NC*

PROFESSIONAL EXPERIENCE

NIH T32 Postdoctoral Scholar, University of Pittsburgh, *Pittsburgh, PA* — August 2023 – Current

- Performed statistical analyses using data from a multi-site neuroimaging study of remitted late-life depression (LLD) with the primary goals of identifying neurobiological factors that differentiate patients with remitted LLD from never-depressed and otherwise healthy participants and contribute longitudinally to depression recurrence.
- Developed neuroimaging processing pipelines to be used in frequency-based functional MRI (fMRI) analyses. We applied this pipeline in a study of remitted LLD, to find differences in brain activity between patients and control participants using BOLD (Blood Oxygenation Level Dependent) signals from fMRI in specified regions.
- Examined sex differences in BOLD signals from task-based fMRI in older adults. Participants were shown conditions (i.e., worry, reappraisal, or neutral statements) generated independently prior to the MR scan to induce an in-scanner response.

NSF-GRFP Graduate Research Associate, UT, *Knoxville, TN* — May 2020 – July 2023

- Created and analyzed dynamical systems models of ordinary differential equations (ODEs) for substance use disorders with the goal of minimizing SUD within a population using optimal control theory.
- Constructed both ODE and stochastic network (SN) models of alcohol use disorder with varied susceptibility to understand the effects of isolation during COVID-19 on drinking behaviors.
- Mentored undergraduate students in the construction of SN models on prescription and illicit opioid use disorders. The SN models served as stochastic analogs to previously developed deterministic ODE models. Mentee Owen Queen received the Barry Goldwater Scholarship in 2021 from the results of this project.

Operations Research Graduate Intern, The MITRE Corporation, *McLean, VA* — May 2022 – August 2022

- Served as the primary mathematician in the creation of an ODE system to model the resiliency of a supply chain when exposed to industry-level shocks/disruptions to examine propagating effects due to the intermediate consumption demands of other industries.
- Collaborated with a team of economic data analysts and operations researchers to obtain data used in construction of the ODE model. Data from Input-Output tables for 55 US industries informed model parameters.

Statistics Intern, UNC School of Medicine, *Chapel Hill, NC* — July 2021 – June 2022

- Consulted with a team of medical researchers to construct a Bayesian statistical model to quantify trends in time of death data for young and otherwise healthy individuals who experienced lethal and sudden cardiac events.
- Performed data analysis, hypothesis testing, and numerical techniques including Markov chain Monte Carlo (MCMC) methods to relate time of death data to preexisting medical conditions.

Graduate Teaching Associate, UT, *Knoxville, TN* — August 2019 – July 2021

- Lectured in Calculus I and II, Business Calculus, and College Algebra to approximately 80-100 students per year.
- Served as instructor of record in Calculus I for the 2020-2021 academic year, 30-35 students per semester.
- Designed course materials (quizzes, tests, worksheets) to assess comprehension and improve understanding.

FELLOWSHIPS AND GRANTS

1. NIH T32 Clinical and Translational Research Training Program 2024, 2025, 2026
2. The National Science Foundation Graduate Research Fellowship Program 2018, 2021, 2022
3. F.M. Dryzer Memorial Graduate Fellowship ($1,000) 2021
4. Graduate Academic Performance Fellowship ($1,000/year) 2019, 2020
5. Graduate Fellowship ($6,000/year) 2019, 2020

PEER-REVIEWED PUBLICATIONS

Published papers in refereed journals.

1. **L. B. Pearcy,** H. T. Karim, M. A. Butters, R. Krafty, B. D. Boyd, L. Banihashemi, S. M. Szymkowicz, B. A. Landman, O. Ajilore, W. D. Taylor, C. Andreescu. (2025). "White matter hyperintensities and relapse risk in late-life depression." *Journal of Affective Disorders.* 383, 298–305.
2. **L. B. Pearcy,** S. Lenhart, W. C. Strickland. (2024). "Structural Instability and Linear Allocation Control in Generalized Models of Substance Use Disorder," *Mathematical Biosciences.* 371 (2024) 109169.
3. N. A. Battista, **L. B. Pearcy,** W. C. Strickland. (2019). "Modeling the prescription opioid epidemic," *Bulletin of Mathematical Biology,* 81(7), 2258-2289.

Papers in preparation, review, or revision.

1. **L. B. Pearcy,** O. Queen, V. Jodoin, S. Lenart, W. C. Strickland. "Construction and Data-driven Analysis of a Stochastic, Individual-based Opioid Epidemiology Network Model." *Under Revision for Mathematical Modelling and Numerical Simulation with Applications.*
2. **L. B. Pearcy,** A. P. Costa, M. A. Butters, R. Krafty, B. D. Boyd, L. Banihashemi, S. M. Szymkowicz, B. A. Landman, O. Ajilore, W. D. Taylor, C. Andreescu, H. T. Karim. "Longitudinal changes in white matter hypointensity and recurrent late-life depression." *Under review at the American Journal of Geriatric Psychiatry.*
3. S. Raminfard, T. Overbey, A. Blazer, W. Snover, **L. B. Pearcy,** M. Pupi, C. Kahn, K. N. R. Chengappa, B. Coffman, A. Versace, D. K. Sarpal. "Microstructural and Diffusion Tensor Imaging of Clozapine for Treatment-Resistant Schizophrenia." *Under Review at Progress in Neuropsychopharmacology & Biological Psychiatry.*
4. K. Eversman, A. Spannaus, R. Campbell, **L. B. Pearcy,** J. Trafton, A. Kapadia, W. C. Strickland. "A modeling study of the opioid epidemic for vulnerable communities in Knoxville, Tennessee." *Under Review at BMC Public Health.*
5. **L. B. Pearcy,** A. E. Hong, L. Rayson, W. S. Bland, S. L. Rosen. "Regional Modeling of Supply Chain Resiliency Across Industries through Ordinary Differential Equation Modeling." *In preparation.*

PROFESSIONAL SERVICE

President of the UTK Math Graduate Student Council (MGSC) 2022-2023

- Served as a liaison between the math graduate student body and the department administration to raise concerns on topics like teaching undergraduate courses, preparation for preliminary exams, and increased stipends.
- Organized professional development opportunities for graduate students, exploring topics such as the creation of CVs and resumes, non-academic jobs and interviews, and industry bootcamps.

President of the Society of Industrial and Applied Mathematics (SIAM) UT Student Chapter 2021-2022

- Moderated events on internships and industry bootcamps for students interested in non-academic positions.
- Coordinated a research presentation competition among graduate students with faculty judges in the style of a mini-symposium, where the top three presenters received a monetary award.
- Sought additional funding requests and filed the annual report with the national SIAM organization.

SKILLS

- **Programming:** Python (>10 yrs.) including NumPy, SciPy, Matplotlib, Pandas, NetworkX, multiprocessing, and more. Experienced in Linux, R, and LaTeX (including BibTeX), and Microsoft Office.
- **Mathematical and Statistical Modeling:** Differential equations modeling, individual-level stochastic modeling, Bayesian and frequentist statistics, Machine learning, Data analysis.
- **Communication and Teamwork:** Experienced in working in team settings and lab groups within academia, undergraduate mentorship, planning and organizing events.