Adam M. Kurth

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Location: Providence, RI

Research Interests

Building on a strong foundation in mathematics and statistics, my research centers on developing rigorous theoretical and computational methods in biostatistics, epidemiology, and public health. I am interested in Bayesian causal inference, survival analysis, experimental designs, and applying to broader epidemiological contexts such as chronic disease, transplantation, cancer.

Education

Brown University — Providence, RI
Doctor of Philosophy, Biostatistics — *Sep. 2025 — present*

Arizona State University — Tempe, AZ
Master of Science, Statistics, 3.8/4.0 – Accelerated, Academic Track — *Aug. 2024 – Jun. 2025*
Thesis: "Investigating Determinants of Birth Weight Using Bayesian Tree-Based Nonparametric Modeling"
Supervised by Dr. Richard P. Hahn
Bachelor of Science, Mathematics (Statistics) – Summa Cum Laude — *Aug. 2021 – Aug. 2024*
Minor in Philosophy, 3.85/4.00

Research Experience

- **School of Mathematical and Statistical Sciences** — Tempe, AZ
  Research Assistant, under Dr. Eleni Panagiotou — *Jan. 2025 – May 2025*
  - Developed novel statistical models integrating knot theory and topology to analyze protein structures, informing NIH-funded neurodegenerative disease research.
  - Led statistical analysis and computational modeling for a collaboration with Dr. Wenwei Zheng, investigating the behavior of intrinsically disordered proteins (IDPs) across varying configurations, temperature conditions, and molecular structures.
- **UGenome AI** — (Remote) Tucson, AZ
  Bioinformatics Intern — *Nov. 2024 – Jan. 2025*
  - Developed and optimized Python-based bioinformatics pipelines for quantifying DNA and RNA mutant allele frequencies from next-generation sequencing data. Integrated statistical methods for filtering variant calling optimization strategies to enhance accuracy and sensitivity.
- **Decision Theater** — Tempe, AZ
  Research Aide — *Aug. 2024 – Dec. 2024*
  - **understand_nlp_sentiment_analysis**: Sole researcher on podcast sentiment analysis and the important role of targeted messaging in the 2024 presidential election.
  - Enhanced research in policy initiatives by delivering presentations, drafting briefs, managing databases, executing models, and meticulously preparing materials for publication.
- **NASA Glenn Research Center (GRC)** — Cleveland, OH
  Research Intern, CHP-PRA Team, under Dr. Mona Matar — *Jun. 2024 – Aug. 2024*
  - Designed and implemented a full natural language processing (NLP) pipeline to classify predefined Mars surface tasks by associated human system demands (e.g., motor control, cognitive complexity), contributing to quantitative risk assessment for human spaceflight.
  - Developed both supervised and unsupervised models (scikit-learn, PyTorch), addressing challenges in multi-label and imbalanced classification through tailored feature engineering and contextual modeling.
  - Integrated task classifications into a Human Reliability Analysis (HRA) framework to inform mission risk models, supporting NASA's biomedical and physical sciences research priorities.

- **Compact X-ray Free Electron Laser (CXFEL)** Tempe, AZ
  Research Aide under Dr. Sabine Botha *Jun. 2023 – Aug. 2024*
  - Developed computational tools and analysis methods for femtosecond crystallography diffraction experiments, advancing protein structure determination using Python, MATLAB, and UNIX/Bash shell scripting.
  - **cxls_hitfinder**: Designed and implemented a deep convolutional neural network (CNN) to detect Bragg peaks and estimate experimental parameters in femtosecond X-ray diffraction imaging data, significantly improving processing speed and accuracy.
  - **waterbackground_subtraction**: Engineered a signal processing algorithm to subtract water background noise under variable flux conditions, enhancing peak detection robustness in diffraction data analysis.

Publications

- Zheng, Y., Reiser, M., & **Kurth, A.** (2). (in preparation). *A Monte Carlo comparison of the efficacy of Mplus, flexMIRT, PROC IRT, ltm, and mirt in IRT models estimation.* Role: Led data collection, simulation design, and comparative analysis.
  This study assesses the relative estimation accuracy of leading IRT software packages, informing best practices in psychometric modeling.

Conferences & Presentations

- **Joint Statistical Meeting (JSM) 2025** – Poster, Nashville, TN Aug. 2025
  Developing Natural Language Processing and Supervised Machine Learning Techniques to Classify Mars Tasks, Kurth, A. M., Rehm H., Matar M.
- **ASU Open Door, SoMSS Research Room** – Poster, Tempe, AZ Feb. 2025
  Proteins as Knots: Implications for Neurodegenerative Diseases, Kurth, A. M.
- **NASA Human Research Program Investigator's Workshop (IWS)** – Poster, Galveston, TX Jan. 2025
  Developing Natural Language Processing and Supervised Machine Learning Techniques to Classify Mars Tasks, Kurth, A. M., Rehm H., Matar M.
- **NASA CHP-PRA Summer Student Research Discussion** – Presentation, Cleveland, OH Aug. 2024
  Using Natural Language Processing AI Tools to Analyze Mars Tasks, Kurth, A. M., Rehm H., Matar M.
- **Biodesign Fusion Research Conference** – Poster, Phoenix, AZ Apr. 2024
  Peak Intensity Analysis for Serial Femtosecond Crystallography Experiments at CXLS, Kurth, A. M., Botha, S.
- **BioXFEL Annual Symposium** – Poster, Tempe, AZ Feb. 2024
  Peak Intensity Analysis for Serial Femtosecond Crystallography Experiments at CXLS, Kurth, A. M., Botha, S.

Conference Abstracts

- **Kurth A. M.** (1), Rehm, H., & Matar, M. (2025, January). *Developing Natural Language Processing and Supervised Machine Learning Techniques to Classify Mars Tasks.* NASA Human Research Program Investigator's Workshop, Galveston, TX.
  Conceived and implemented NLP classification models for Mars mission data, contributing to task characterization.
- Matar, M., Rehm, H., & **Kurth, A. M.** (3) (2025, January). *Large language models and generative AI tools to depict human systems' contribution to spaceflight tasks execution.* NASA Human Research Program Investigator's Workshop, Galveston, TX.
  Contributed technical insights into efforts at NASA GRC utilizing generative AI for human space flight classification.
- Botha, S., Everett, E., Ketwala, G., **Kurth, A. M.** (1), Verlarde, A., Grant, T. G., Kirian, R. (2024, October). *Data Analysis Tools for the Compact X-ray Light Source and Compact X-ray Free Electron Laser Facilities at ASU.* 18th International Conference for the Crystallization of Biological Macromolecules (ICCBM), Tempe, AZ.
  Highlighted development of computational techniques for femtosecond crystallography data analysis.
- **Kurth, A. M.** (1), Botha, S. (2024, March). *Data Analysis Tools for the Compact X-ray Light Source and Compact X-ray Free Electron Laser Facilities at ASU.* 2024 BioXFEL Spring Symposium, Tempe, AZ.
  Introduced novel data analysis techniques for femtosecond crystallography for the CXLS/CXFEL.

Achievements

- ***2025***: ASU Graduate College University Grant (GCUG).
- ***2024***: Rising Star Nomination NASA GRC, Accelerated Master's Award, John W. Luttrell Children's Network Scholarship, BioXFEL Scholar.
- ***2023***: Pediatric Cancer Research Foundation Survivor Scholarship, Coats & Todd Overcoming Disability Scholarship, Ruth Cheatham Foundation, HPFY Beyond Disability Scholarship.
- ***2022***: Burress Family Foundation Underdog Scholarship, John W. Luttrell Children's Network Scholarship.
- ***2021***: ASU Alumni Legacy Scholarship, President's List.

Technical Skills & Interests

- **Statistics**: Distribution and inference theory, Bayesian inference, causal inference, linear models, regression analysis, analysis of variance (ANOVA), mathematical statistics, deep/machine learning, natural language processing (NLP).
- **Mathematics**: Real analysis, advanced calculus, numerical analysis, computational imaging, computational linear algebra, geometry, topology (knot theory), symbolic logic.
- **Programming Languages**: Python, R/RStudio, Bash, UNIX/Linux command line, MATLAB, Java, LaTeX.
- **Tools & Frameworks**: PyTorch, scikit-learn, Git/GitHub/GitLab, Sphinx/GitPages, web development.
- **Research Focus**: biostatistics, causal inference, medical imaging, epidemiology, epistemology, clinical decision-making, information theory, deep/machine learning.
- **Data Visualization**: ggplot2, Matplotlib, Seaborn, Plotly, Tableau.
- **Soft Skills**: Experienced public speaker and presenter in technical and non-technical settings.
- **Interests**: Classical literature, philosophical analysis, fitness, meditation.

Core Competencies & Keywords

Bayesian inference, frequentist statistics, causal inference, hierarchical and mixed effects models, survival analysis, adaptive clinical trial design, regression modeling, generalized linear models, longitudinal data analysis, machine learning, deep learning, natural language processing (NLP), predictive modeling, uncertainty quantification, decision theory, risk stratification, risk modeling, statistical programming (Python, R), data visualization, clinical trial methodology, epidemiology, pharmaceutical statistics, regulatory compliance, health outcomes research, reproducible research, high-performance computing, software development, data wrangling, bioinformatics.

Volunteering & Community Engagement

- **Starlab ExpertLink 2024** – Talk, Virtual from AZ — Oct. 2024

  Served as a STEM expert panelist for K–12 students, focusing on sustainability, astronaut health, and NASA research initiatives. Cultivated science communication skills, contributing to early STEM education.

- **AZBIO: Voice of the Patient** – Talk, Phoenix, AZ — Sep. 2024

  Delivered a talk to AZBIO Voice of the Patient discussing personal health experiences in transplantation, discussing the intersection of community engagement, patient advocacy, and public health considerations.

- **ASU News: Math and stats grad beats the odds...** – Article, Tempe, AZ — May 2024

  Featured in ASU News discussing resilience, academic achievement in mathematics and statistics, and overcoming health challenges.

- **APHON AZ: Patient Panel** – Talk, Phoenix, AZ — Apr. 2024

  Spoke at the Association of Pediatric Hematology/Oncology Nurses annual conference, sharing patient perspectives and insights into healthcare outcomes research.

- **Donate Life Arizona**: Tempe, AZ — Sep. 2022 – present

  Actively engaged in organ donation advocacy, contributing to community awareness events, educational programs, and outreach campaigns.
  - **Campus Challenge: ASU Diablo's Club Zero**: Aug. 2024
    Supported on-campus organ donation advocacy and information dissemination.

- **Speaker's Workshop**: Mar. 2024
  Participated in sessions to refine public speaking and community education strategies.
- **Annual Fiesta Bowl Parade**
- **Donate Life AZ 2022 Calendar Feature & Interview**
  Interview and featuring in Donate Life AZ annual calendar. Discussing personal story in interview format for community outreach for organ donation.
- **Monthly Volunteer Meetings**

- **Children's Organ Transplant Association**: Remote/Scottsdale, AZ Apr. 2020 – present
  Organized fundraising events, including a golf tournament, to support lifelong immunosuppressant medication costs.
  - **2022 COTA Calendar** – Nov. 2022
    Promotion and featuring in annual calendar by discussing personal story for community engagement for transplantation awareness.
  - ***The Mulligan* Golf Tournament** – May 2022
    Main contributor in planning golf tournament operations, catering and overall planning and organization. This fundraising event was to raise money for my life-long reliance on immunosuppressant medication due to transplantation. All proceeds went to COTA for Adam K.

References

Sally Morton, Mentor
Executive VP Knowledge Enterprise ASU
Phone: 480-965-4087
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Mona Matar, Supervisor & Mentor
Research Mathematician, NASA GRC
Phone: 704-706-5350
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Richard Hahn, MS Advisor, Professor
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