

Joel Eliason, PhD

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🔗 Google Scholar

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Education

- August 2022 – August 2025  **Ph.D., Bioinformatics, University of Michigan**
Thesis title: *Multiscale Statistical Models for Understanding Tumor Microenvironment Heterogeneity.*
- April 2022  **M.Sc., Biostatistics, University of Michigan**
- June 2017  **M.Sc., Applied Mathematics, Northwestern University**
- April 2016  **B.Sc., Mathematics, Brigham Young University**

Selected Research Publications

Journal Articles

- 1 **Eliason, J.**, Frankel, T., Rao, A. & Peruzzi, M. Joint Modeling of Spatial Dependencies Across Multiple Subjects in Multiplexed Tissue Imaging. Under review (2025).
- 2 **Eliason, J.**, Peruzzi, M. & Rao, A. SHADE: A Multilevel Bayesian Approach to Modeling Directional Spatial Associations in Tissues. Submitted (2025).
- 3 **Eliason, J.** & Rao, A. A Bayesian Multilevel Survival Model Incorporating Uncertainty in Spatially-Integrated Functional Covariates. In preparation (2025).
- 4 **Eliason, J. et al.** Characterizing Spatial Immune Architecture in Metastatic Melanoma Using High-Dimensional Multiplex Imaging. *Frontiers in Immunology* **16**, 1560778. ISSN: 1664-3224. (2025) (Apr. 29, 2025).
- 5 **Eliason, J.** & Rao, A. Investigating Ecological Interactions in the Tumor Microenvironment Using Joint Species Distribution Models for Point Patterns. *The New England Journal of Statistics in Data Science* **2**. Publisher: New England Statistical Society, 296–310. ISSN: 2693-7166 (June 2024).
- 6 Tsang, A. P. *et al.* Assessing the Tumor Immune Landscape Across Multiple Spatial Scales to Differentiate Immunotherapy Response in Metastatic Non-Small Cell Lung Cancer. *Laboratory Investigation* **104**, 102148. ISSN: 0023-6837 (Nov. 2024).
- 7 Masotti, M., Osher, N., **Eliason, J.**, Rao, A. & Baladandayuthapani, V. DIMPLE: An R package to quantify, visualize, and model spatial cellular interactions from multiplex imaging with distance matrices. *Patterns* **4**. Publisher: Elsevier. ISSN: 2666-3899 (Dec. 2023).

Conference Proceedings

- 1 Kulkarni, R., Patel, G., **Eliason, J.** & Rao, A. *Tensor decomposition to identify context-aware spatial neighborhoods in the tumor microenvironment* in 2024 46th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) ISSN: 2694-0604 (July 2024), 1–4.

- 2 Chetty, V., **Eliason, J.** & Warnick, S. *Passive reconstruction of non-target-specific discrete-time LTI systems in 2016 American Control Conference (ACC)* ISSN: 2378-5861 (July 2016), 66–71.

Employment History

- January 2022 – July 2025  **Bioinformatics Graduate Research Assistant** *University of Michigan*
Integrative quantitative analysis of the ecology of the tumor microenvironment (TME) using spatial omics. Applying advanced statistical and machine learning tools to disentangle complex interactions in the highly multivariate setting of the TME.
- May 2024 – August 2024  **Quantitative Systems Pharmacology Intern** *Johnson & Johnson*
Used a mathematical model of lymphoma to characterize exposure-response curves for T cell redirectors.
- January 2021 – January 2022  **Biostatistics Research Assistant** *University of Michigan*
Developed an algorithm for precision matrix estimation for Gaussian graphical models.
- November 2018 – July 2020  **Software Engineer** *Pariveda Solutions*
- June 2017 – June 2018  **Applied Mathematics Research Assistant** *Northwestern University*
Conducted research in Bayesian methods, regularization, and optimal experimental design techniques for selecting the simplest yet best-fitting model of a dynamical system.

Skills

- Modeling  Bayesian hierarchical modeling, uncertainty quantification, quantitative systems pharmacology (QSP), ODE/PDE/ABM-based modeling of tumor microenvironment.
- Statistical  Spatial statistics, regression modeling, survival analysis, predictive analytics, machine learning, deep learning, Bayesian statistics.
- Computational  R, Python, Bash, C++, Simbiology, MATLAB, Git, $\text{\LaTeX}$.
- Languages  Fluent in English, proficient in Russian.
- Miscellaneous  Academic research, teaching, scientific writing, statistical consulting, HPC computing.

Miscellaneous

Awards and Achievements

- August 2022 – August 2024  **Proteogenomics in Cancer Training Fellowship**, University of Michigan.
- October 2015  **ORCA Research Grant**, Brigham Young University.

Miscellaneous (continued)

2012 – 2016  **Full Tuition Scholarship**, Brigham Young University.

Teaching Experience

Fall 2020  **Graduate Student Instructor**, Applied Biostatistics, University of Michigan.

Spring 2018  **Teaching Assistant**, Honors Engineering Analysis IV, Northwestern University.

Winter 2018  **Teaching Assistant**, Differential Calculus, Northwestern University.

Fall 2017  **Teaching Assistant**, Multivariate Differential Calculus, Northwestern University.

Outreach and Leadership

 **Volunteer, Science in Society.** Taught elementary-age children about space science and medicine.

 **Volunteer, Applied Math in Action.** Presented to community college students about the utility and excitement of studying applied mathematics.

 **Co-President**, ESAM Student Leadership Board, Northwestern University.