Spencer Krieger, PhD

POSITIONS HELD

Aug 2026 – present
Assistant Professor
Dartmouth College, Biomedical Data Science

Aug 2022 – Aug 2026
Lane Fellow
Carnegie Mellon University, Ray and Stephanie Lane Computational Biology Department
Research Advisor: Jian Ma

Jun 2016 – Jul 2022
Graduate Research Associate
University of Arizona, Computer Science
Research Advisor: John Kececioglu

Jan 2014 – Apr 2016
Undergraduate Research Assistant
Brigham Young University, Chemistry and Biochemistry
Research Advisor: Roger Harrison

EDUCATION

Jul 2022
PhD in Computer Science
University of Arizona

May 2020
MS in Computer Science
University of Arizona

Apr 2016
BS in Biochemistry
Brigham Young University
Computer Science minor

HONORS AND RECOGNITION

Awards

Aug 2022 – Aug 2026 Lane Fellowship, Ray and Stephanie Lane Computational Biology Department, Carnegie Mellon University

Feb 2022 Graduate Student Research Award, Department of Computer Science, University of Arizona

May 2021 Department Fellowship Award, Department of Computer Science, University of Arizona

Jul 2020 Best talk for "Predicting protein secondary structure through nearest neighbor search and method hybridization", SCS 2020

Apr 2020 Graduate Student Service Award, Department of Computer Science, University of Arizona

2018, 2020 Galileo Circle Scholar, College of Science, University of Arizona

Apr 2014 – Apr 2016 Undergraduate Research Award, College of Physical and Mathematical Sciences, Brigham Young University

Leadership

2024 – 2025 Chair, Postdoctoral Fellowships Committee, Ray and Stephanie Lane Computational Biology Department, Carnegie Mellon University

2018 – 2024 Web Committee Chair, Student Council, International Society for Computational Biology (ISCB)

2020 Web Chair, *ISCB Student Council Symposium* (SCS), International Society for Computational Biology (ISCB)

2018 – 2020 Vice President (and Cofounder), Graduate Student Council, Department of Computer Science, University of Arizona

PUBLICATIONS

* indicates co-first author, † indicates co-corresponding author

Preprint and Submitted Manuscripts

Ellie Haber*, Shahul Alam*, Nicholas Ho*, Renming Liu, Evan Trop, Shaoheng Liang, Muyu Yang, **Spencer Krieger**†, and Jian Ma†, "Heimdall: A modular framework for tokenization in single-cell foundation models.", ***bioRxiv***, 2025. [link]

Ajinkya Deshpande, Zhilei Bei, Jian Ma†, and **Spencer Krieger**†, "Mimyr generates spatial transcriptomics in damaged tissue regions.", ***bioRxiv***, 2025. [link]

Spencer Krieger, Ellie Haber, and Jian Ma, "Eykthyr reveals transcriptional regulators shaping spatial gene programs.", ***bioRxiv***, 2025. [link]

Conference Papers

RECOMB and ISMB are widely recognized as the top conferences in computational biology, publishing full peer-reviewed papers with acceptance rates of 15–20%.

Ellie Haber, Ajinkya Deshpande, Jian Ma†, and **Spencer Krieger**†, "Unified integration of spatial transcriptomics across platforms." Proceedings of the 29th International Conference on *Research in Computational Molecular Biology* (**RECOMB**), 2025. [link]

Spencer Krieger and John Kececioglu, "Computing robust optimal factories in metabolic reaction networks." Proceedings of the 28th International Conference on *Research in Computational Molecular Biology* (**RECOMB**), Springer LBNI 14758, 253-269, 2024. [link]

Spencer Krieger and John Kececioglu, "Computing shortest hyperpaths for pathway inference in cellular reaction networks." Proceedings of the 27th International Conference on *Research in Computational Molecular Biology* (**RECOMB**), Springer LBNI 13976, 155-173, 2023. [link]

Spencer Krieger and John Kececioglu, "Computing optimal factories in metabolic networks with negative regulation." Proceedings of the 28th International Conference on *Intelligent Systems for Molecular Biology* (**ISMB**), *Bioinformatics* 38, 2022. [link]

Spencer Krieger and John Kececioglu, "Fast approximate shortest hyperpaths for inferring pathways in cell signaling hypergraphs." Proceedings of the 21st International *Workshop on Algorithms in Bioinformatics* (**WABI**), 20, 1-20, 2021. [link]

Spencer Krieger and John Kececioglu, "Predicting protein secondary structure by an ensemble through feature-based accuracy estimation." Proceedings of the 11th ACM Conference on *Bioinformatics, Computational Biology, and Health Informatics* (**ACM-BCB**), 29, 1-10, 2020. [link]

Spencer Krieger and John Kececioglu, "Boosting the accuracy of protein secondary structure prediction through nearest neighbor search and method hybridization." Proceedings of the 28th International Conference on *Intelligent Systems for Molecular Biology* (**ISMB**), *Bioinformatics* 36, i317-i325, 2020. [link]

Journal Papers

Ellie Haber, Ajinkya Deshpande, Jian Ma†, and **Spencer Krieger**†, "Unified integration of spatial transcriptomics across platforms with LLOKI." ***Genome Research***, 2025. [link]

Spencer Krieger and John Kececioglu, "Robust optimal metabolic factories." ***Journal of Computational Biology***, 31, 10, 2024. [link]

Spencer Krieger and John Kececioglu, "Shortest hyperpaths in directed hypergraphs for reaction pathway inference." ***Journal of Computational Biology*** 30, 11, 2023. [link]

Spencer Krieger and John Kececioglu, "Heuristic shortest hyperpaths in cell signaling hypergraphs." ***BMC Algorithms for Molecular Biology*** 17, 12, 2022. [link]

Wai Ning Chan, Jacob Warren, **Spencer Krieger**, Benjamin Vestal and Roger Harrison, "Separation and preconcentration of perrhenate from ionic solutions by ion exchange chromatography." ***Journal of Chromatography A*** 1631, 461588, 2020. [link]

Other Publications

Wim Cuypers, Handan Melike Dönertaş, Jasleen Grewal, Chase Donnelly, Arvind Singh Mer, **Spencer Krieger** and Bart Cuypers, "Highlights from the 16th International Society for Computational Biology Student Council Symposium 2020." ***F1000Research***, 10(ISCB Comm J): 443, 2021. [link]

Faryad Darabi Sahneh, Alon Efrat, Stephen Kobourov, **Spencer Krieger** and Richard Spence, "Approximation algorithms for the vertex-weighted grade-of-service Steiner tree problem." ***arXiv***, 2018. [link]

INVITED TALKS

Feb 2025 "Decoding Multi-scale Spatial Gene Regulation: From Data Integration to Biological Digital Twins", Department of Biomedical Data Science, Dartmouth College, Hanover.

Jan 2025 "Decoding Multi-scale Spatial Gene Regulation: From Data Integration to Biological Digital Twins", Clemson University Institute for Human Genetics, Greenwood.

Jan 2026 "Decoding Multi-scale Spatial Gene Regulation: From Data Integration to Biological Digital Twins", Department of Biological Sciences, UT Dallas, Dallas.

May 2025 "Integrative analysis of spatial omics across modalities and platforms", Conference on Statistics in Genomics and Genetics (**STATGEN**), Minneapolis.

May 2022 "Algorithmic inference of protein secondary structure and cell-signaling/metabolic pathways", Computational Biology Department, Carnegie Mellon University, Pittsburgh.

Apr 2022 "Algorithmic inference of protein secondary structure and cell-signaling/metabolic pathways", University of California - San Diego, La Jolla.

Apr 2022 "Algorithmic inference of protein secondary structure and cell-signaling/metabolic pathways", National Cancer Institute, NIH, Bethesda.

Mar 2022 "Algorithms for pathway inference and protein secondary structure prediction", The Pennsylvania State University, State College.

Feb 2022 "Shortest hyperpaths and their applications in cell-signaling networks", Department of Computer Science Colloquium, University of Montana, Missoula.

Sep 2020 "Boosting the accuracy of protein secondary structure prediction through nearest neighbor search and method hybridization", Highlights talk in the 11th ACM Conference on *Bioinformatics, Computational Biology, and Health Informatics* (**ACM-BCB**), Virtual.

CONFERENCE TALKS

Apr 2024 "Computing robust optimal factories in metabolic reaction networks", Proceedings talk in the 28th International Conference on *Research in Computational Molecular Biology* (**RECOMB**).

Apr 2023 "Computing shortest hyperpaths for pathway inference in cellular reaction networks", Proceedings talk in the 27th International Conference on *Research in Computational Molecular Biology* (**RECOMB**).

Jul 2022 "Computing optimal factories in metabolic networks with negative regulation", Proceedings talk in the 30th International Conference on *Intelligent Systems for Molecular Biology* (**ISMB**).

Jul 2022 "Computing optimal factories in metabolic networks with negative regulation", Proceedings talk in the 18th *ISCB Student Council Symposium* (**SCS**).

Aug 2021 "Fast approximate shortest hyperpaths for inferring pathways in cell signaling hypergraphs", Proceedings talk in the 21st International *Workshop on Algorithms in Bioinformatics* (**WABI**).

Jul 2021 "Fast approximate shortest hyperpaths for inferring pathways in cell signaling hypergraphs", Proceedings talk in the 17th *ISCB Student Council Symposium* (**SCS**).

Sep 2020 "Predicting protein secondary structure by an ensemble through feature-based accuracy estimation", Proceedings talk in the 11th ACM Conference on *Bioinformatics, Computational Biology, and Health Informatics* (**ACM-BCB**).

Jul 2020 "Boosting the accuracy of protein secondary structure prediction through nearest neighbor search and method hybridization", Proceedings talk in the 28th International Conference on *Intelligent Systems for Molecular Biology* (**ISMB**).

Jul 2020 "Predicting protein secondary structure through nearest neighbor search and method hybridization", Proceedings talk in the 16th *ISCB Student Council Symposium* (**SCS**).
Best talk award

Mar 2016 "Separation of pertechnetate from nuclear waste", **Spring Research Conference**, Brigham Young University.

Mar 2015 "Selective preconcentration of perrhenate using ion chromatography", **Spring Research Conference**, Brigham Young University.

POSTERS

Apr 2024 "Eykthyr reveals transcriptional regulators of spatial gene programs", The 28th International Conference on *Research in Computational Molecular Biology* (**RECOMB**)

Jul 2020 "Boosting the accuracy of protein secondary structure prediction through nearest neighbor search and method hybridization", The 28th International Conference on *Intelligent Systems for Molecular Biology* (**ISMB**)

Jul 2020 "Predicting protein secondary structure through nearest neighbor search and method hybridization", The 16th *ISCB Student Council Symposium* (**SCS**)

Mar 2016 "Separation of pertechnetate from nuclear waste", **Spring Research Conference**, Brigham Young University

Mar 2015 "Selective preconcentration of perrhenate using ion chromatography", **Spring Research Conference**, Brigham Young University

MENTORING

Jan 2023 – present Ellie Haber, PhD student in Machine Learning Department

2023 – present Mentor, Undergraduate AI Mentoring Program, School of Computer Science, Carnegie Mellon University

Apr 2024 – present Xue Er Ding, PhD student in CPCB

Jul 2024 – present Zhilei Bei, Summer visiting undergraduate in Ma Lab

Oct 2024 – present Ajinkya Deshpande, MS student in Machine Learning Department

Feb 2025 – present Wenduo Cheng, PhD student in CPCB

SERVICE

Reviewer - Journals: *Bioinformatics, Nature Methods, Research, Nucleic Acids Research*; Conferences: *SCS 19-22*

2024 – 2026 Web Committee Advisor, Student Council, International Society for Computational Biology (ISCB)

2023, 2024 Panel on Applying to Postdoctoral Positions, Ray and Stephanie Lane Computational Biology Department, Carnegie Mellon University

2023, 2024 Poster Judge, Sigma Xi Meeting of the Minds, Carnegie Mellon University

2018 – 2020 Graduate Affairs Committee Member, Department of Computer Science, University of Arizona

2019 – 2020 Faculty Recruiting Committee Graduate Student Liaison, Department of Computer Science, University of Arizona

2017 – 2018 Web Committee Member, Student Council, International Society for Computational Biology (ISCB)