

Brandin L Farris (Farris)

Curriculum Vitae

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Research Focus

Data science and data analysis with a focus in computational topology; developing tools for data analysis.

Education

Oregon State University | *Corvallis, OR*
Ph.D. in Mathematics

September 2024-2029

Oregon State University | *Corvallis, OR*
Masters in Mathematics

September 2024-2026

Washington State University | *Vancouver, WA*
B.S. in Applied Mathematics

September 2020-May 2024

Lower Columbia College | *Longview, WA*
A.S. in Physics

January 2018-May 2020

Research Experience

Topological Analysis of Causal Discovery | *Tohoku University, Japan*

June 2026-present

Spent a summer studying the Fujitsu's Causal AI pipeline which takes as input a data matrix and combines Wide Learning (a method for finding linguistic conditions that maximize some target variable), and Direct LiNGAM (an algorithm for computing causal graphs). Developed novel topological and geometric techniques for studying the output of the pipeline. Currently improving the methods and applying to real data.

Exposition on the Persistence Algorithm | *OSU, OR*

September 2024-present

Writing an exposition on the persistent homology algorithm and its optimizations over a field. In particular, building from elementary linear algebra and elementary group theory to the persistence module, barcodes, the standard algorithm, and a modern variation. Also covers well known optimizations including clearing, implicit reduction, and skipping the computation of apparent pairs.

Quantum Simulation | *UCLA, California*

June 2024-August 2024

Designed a method to simulate quantum systems involving computationally expensive operations. We expanded upon the existing Gottesman-Knill formalism which simulates certain operations efficiently to also simulate other operators, minimizing error and maximizing computational efficiency.

Image Analysis | *Vancouver, WA*

January 2023-May 2024

Plants contain nodules that can improve crop productivity and stress tolerance, making them a worthy subject of study. Developed a high throughput framework for analyzing images of nodules using Java. Employed clustering algorithms and data analysis techniques to generate statistics on over 10,500 nodules. Made the program accessible to biology students by creating a user interface.

Talks

G-RIPS Sendai: "A Topological Approach to Conditional Causality"

August 2026

WSU: "Persistent Simplicial Homology and its Computation"

January 2026

OSU: "Optimizations of the Persistence Algorithm Over a Field"

January 2026

JMM: "Simulating Quantum Circuits with Non-Clifford Noise"

January 2025

Cascade Rain: "Characterizing Root Nodule-Host Interactions using Image Analysis"

April 2024

Workshops and Conferences

BIRS: Workshop on cycle representatives in applied homological algebra	August 2025
JMM: Simulating quantum circuits with non-clifford noise	Jan 2025
Cascade Rain: Image analysis of biological nodules	April 2024
Surca: Poster on a framework for analyzing nodule clusters	March 2024

Teaching

Algebra, trigonometry, calculus, vector calculus, linear algebra,

Professional Services

DRP: Mentored student through chapter 2 of “Computational Topology for Data Analysis”	Spring 2026
Organize weekly research dissemination for the TDA group at OSU.	September 2025-present

Software

Nodule Segmentation

Java-based, user-facing program for automatically segmenting, counting, and measuring nodules imaged under fluorescent lighting. <https://github.com/Farris2002/Nodule-Segmentation>

Nodule Distances

Java-based, user-facing extension of Nodule Segmentation A program that converts the imaged root systems into undirected graphs and computes shortest paths between nodes (among other statistics).
<https://github.com/Farris2002/Nodule-Segmentation>

Skills

Python, ripser, open-applied-topology, Java, ImageJ, LaTeX,

References

Chad Giusti | *Oregon State University Professor of Mathematics*
PhD research advisor

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Ogawa Masaki | *Tohoku University*
Academic Mentor during G-RIPS program

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Bala Krishnamoorthy | *Washington State University Professor of Mathematics*
Undergraduate research advisor

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