Brea Swartwood

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EDUCATION

Stanford University — Sept. 2024 – present

Doctor of Philosophy in Computational and Mathematical Engineering (3.73/4.00) — *Stanford, CA*
- Advisor: Hamdi Tchelepi, Professor of Stanford Department of Energy Science and Engineering
- Relevant Coursework: Numerical PDEs, Convex Optimization, Numerical Linear Algebra, Stochastic Differential Equations, Parallel Computing, Design and Analysis of Algorithms

California Institute of Technology — Sept. 2020 – June 2024

Bachelor of Science in Applied and Computational Mathematics (4.1/4.3) — *Pasadena, CA*
- Relevant Coursework: Methods of Computational Mathematics, Methods of Applied Mathematics, Computational Cameras, Discrete Mathematics, Machine Learning and Data Mining, Markov Chains, Discrete Stochastic Processes and Applications
- Teaching Assistant for: Introduction to Computational Science and Engineering, Applied Linear Algebra, Introduction to Computer Science in Industry, Markov Chains and Stochastic Processes

EXPERIENCE

Stanford PhD Research — September 2024 – present

Stanford University — *Stanford, CA*
- GPU Parallelization of Adaptive Conservative Time Integration (ACTI) for Multiphysics Systems
- work was presented at SIAM Conference on Mathematical & Computational Issues in the Geosciences in October of 2025 (GS25)
- Accepted and will be presenting at SIAM Conference on Parallel Processing for Scientific Computing (PP26)

Summer Undergraduate Research Fellow — June 2023 – August 2023

University of Illinois Urbana-Champaign — *Urbana-Champaign, IL*
- Constructed unstable manifold for reduced version of the Gatenby-Gawlinski tumor invasion model
- *Stability analysis of traveling wave fronts in a model for tumor growth* is now published in Science Direct's Nonlinear Analysis: Real-World Applications Journal

Summer Undergraduate Research Fellow — June 2022 – August 2022

California Institute of Technology — *Pasadena, CA*
- Worked on private capital market data to predict failure of US startups that were founded before 2017
- Presented research to BlackRock's Systematic Active Equity Team/SCCUR 2022 conference

Summer Undergraduate Research Fellow — June 2021 – August 2021

University of California San Diego — *San Diego, CA*
- Contributed to the Augmented Imaging and Data Analytics (AiDA) research laboratory by reducing inaccuracy of previous method of locating valves from 10 mm to 2 mm
- Presented research at Caltech in the Summer Undergraduate Research Fellowship Program

TEACHING

Stanford Course Assistant | *Convex Optimization* — January 2025 – Present
- CME 364A: Convex Optimization

Caltech Teaching Assistant | *Matlab, Linear Algebra* — June 2020 – Present
- ACM 11: Introduction to Computational Science and Engineering (2x)
- ACM 216: Markov Chains and Stochastic Processes
- ACM 104: Applied Linear Algebra
- CS 19: Introduction to Computer Science in Industry

Caltech Y Rise Tutor | — Sept. 2020 – June 2024
- Tutored middle and high school students for 100+ hours in various high school mathematics classes including geometry, algebra, and trigonometry

Curious Cardinals Tutoring | — July 2024 – present
- Tutors middle school and high school students online through interactive sessions
- Focus varies between academic instruction, passion projects, and college application preparation work

Technical Skills

Programming Skills: Java, Python, MATLAB, Mathematica, Julia, C++, CUDA, working on HPC clusters
Technical Knowledge: Parallel Computing, Numerical Linear Algebra, Real Analysis, Measure Theory, PDEs, Optimization, Statistics, Statistical Inference, Machine Learning