Connor Leipelt

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EDUCATION

University of Massachusetts Amherst, Amherst, MA — September 2023 — May 2025
Master of Science in Applied Mathematics — Cumulative GPA: 3.730/4.00

California Polytechnic State University San Luis Obispo, San Luis Obispo, CA — September 2019 — June 2023
Bachelor of Science in Mathematics — Cumulative GPA: 3.237/4
Minor in Philosophy — Major GPA: 3.267/4

ACADEMIC EXPERIENCE

RESEARCH:

University of Massachusetts Amherst — Amherst, MA
Graduate Research Assistant — June 2024 — August 2024

- Work in Fourier/Harmonic Analysis:
  - Worked with Dr. Andrea Nahmod through key ideas of Fourier/Harmonic Analysis.
  - Investigated Rademacher functions and their connections in understanding solutions to the Nonlinear Schrödinger Equation for Dr. Nahmod.

California Polytechnic State University of San Luis Obispo — San Luis Obispo, CA
FROST Research Fellow — June 2022 — October 2022

- Summer Research Fellow in Nonlinear Waves:
  - Applied mathematical research under Dr. Efstathios Charalampidis on numerically testing novel boundary conditions related to the Nonlinear Schrödinger Equation.

TEACHING:

University of Massachusetts Amherst — Amherst, MA
Graduate Teaching Assistant — September 2023 — May 2025

- Math 131 Discussion: Calculus I (Fall 2023, Fall 2024)
- Math 132 Discussion: Calculus II (Spring 2024, Spring 2025)

California Polytechnic State University of San Luis Obispo — San Luis Obispo, CA
Workshop Facilitator — March 2023 — June 2023

- Math 248: Methods of Proofs Workshop: One unit course, taught for two hours twice a week.

SELECTED COURSES

Graduate Courses

PhD Level :

- Math 605 Probability Theory I
- Math 606 Stochastic Processes and Applications
- Math 624 Real Analysis II
- Math 645 Differential Equations and Dynamical Systems I
- Math 652 Numerical Analysis II
- Math 690 Mathematical Cell Biology (Special Topics)
- Math 690 Real and Artificial Neural Networks (Special Topics)
- Math 690 Mathematics/Generative Modeling (Special Topics)
- Math 731 Partial Differential Equations I
- Math 790 Probabilistic Methods for Nonlinear Dispersive PDEs (Special Topics)

Master's Level:

- Math 590 Mathematical Machine Learning (Special Topics)

Bachelor's Courses

- Math 411 Complex Analysis II
- Math 413 Real Analysis II
- Math 400 Special Problems for Advanced Undergrads (Complex Analysis III)
- Math 440 Topology I
- Math 453 Numerical Optimization
- Math 560 Field Theory (Abstract Algebra III **-Graduate Level Course**)

RESEARCH INTERESTS

Biomathematics related to cancer cells, Mathematics of Machine Learning and its connection to probabilistic processes, Numerical Analysis and implementation of Partial Differential Equations, Harmonic, Fourier, and Functional Analysis

SKILLS

- **Programming:** MATLAB, Python and PyTorch, LaTeX, Unity Research Computing Program, HTML, R Studio, JMP, Morpheus, VS Code

PROJECTS

GRADUATE:

Understanding Equivariant Flows on Symmetric Densities & its Connection to Protein Folding Amherst, MA
Project for Math 690: Mathematics/Generative Modeling February 2025 — May 2025

- Presented research paper by Noé, et al. Demonstrated how Equivariant Flows efficiently sample protein conformations respecting symmetry constraints. Emphasized creation of an equivariant flow, optimized by machine learning. This generative modeling approach tractably outperforms current state of the art sampling methods (Molecular Dynamics, Markov-Chain Monte-Carlo simulations).
- Understanding Equivariant Flows on Symmetric Densities PDF

Kinetic Monte Carlo Methods for 3D Diffusive Capture Problems on Cells Amherst, MA
Project for Math 606: Stochastic Processes and Applications February 2025 — May 2025

- Presented research paper by Lindsay, et al. Particle-based Kinetic Monte Carlo method that provides rapid accurate simulations of arrival statistics in domains with absorbing traps, including half-spaces and convex cellular geometries.
- Kinetic MC Methods for 3D Diffusive Capture Problems PDF

Unsupervised Learning of Cancer Data Amherst, MA
Project for Math 590: Mathematical Machine Learning February 2024 — May 2024

- Applied Gaussian mixture models (EM algorithm), hierarchical agglomerative clustering, and k-means clustering to cancerous tumor data, discovering non-trivial groupings.
- Unsupervised Learning of Cancer Data PDF

Modeling the Growth of Cancerous Tumors Amherst, MA
Project for Math 690: Mathematical Cell Biology September 2023 — December 2023

- Modeled tumor growth using a Gompertz and two-compartment pharmacokinetic/pharmacodynamic ODE system to study the interaction between tumor growth and chemotherapy.
- Modeling the Growth of Cancerous Tumors PDF

Fourier/Harmonic Analysis Amherst, MA
Notes from University of Massachusetts Amherst Research Assistantship June 2024 — August 2024

- Produced a set of expository notes covering core ideas in Fourier and harmonic analysis studied during summer research assistantship with Dr. Andrea Nahmod.
- Fourier/Harmonic Analysis PDF

Probabilistic Methods for NLSE Amherst, MA
Lecture and Project for Math 790: Probabilistic Methods for Nonlinear Dispersive PDEs February 2024 — May 2024

- Delivered a lecture on multi-linear large deviation estimates for Gaussian series (Wiener Chaos). Lecture followed notes from Dr. Jean Bourgain's paper *Invariant Measures for the 2D-Defocusing Nonlinear Schrödinger Equation.*
- Probabilistic Methods for NLSE PDF

UNDERGRADUATE:

Senior Project: Modeling Cancer Growth Using Differential Equations San Luis Obispo, CA
Senior Project January 2023 — April 2023

- Senior project advised by Dr. Joyce Lin. Coded an ODE solver to predict the growth of cancerous tumors. Created a novel differential equation to model growth of cancerous tumors.
- Senior Project: Modeling Cancer Growth Using Differential Equations PDF

Computation of Nonlinear Waves San Luis Obispo, CA
FROST Summer Research June 2022 — October 2022

- Summer research project on numerical applications of novel boundary conditions for the Nonlinear Schrödinger Equation.
- Computation of Nonlinear Waves PDF

REFERENCES

Dr. Markos Katsoulakis
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