

Exponent®
Engineering & Scientific Consulting

Noah Lee, Ph.D.

Scientist | Computer, Data & Security Sciences
Los Angeles
+1-310-754-2778 | leen@exponent.com

Professional Profile

Noah Lee, Ph.D., is an interdisciplinary applied mathematician who integrates mathematical and statistical analysis, computer simulation, machine learning, and artificial intelligence to study complex phenomena in physics, chemistry, biology, and engineering.

Dr. Lee earned his M.A. and Ph.D. in Applied and Computational Mathematics from Princeton University. Before joining Exponent, he was a postdoctoral researcher at Vanderbilt University, where he developed mathematical tools to characterize the macroscopic behavior of fluid-dynamical and electrochemical systems. His work examined how interactions among fluids, charged particles, surfaces and membranes, and externally applied electric fields influence system behavior across multiple spatial and temporal scales. His findings helped explain some of the mechanisms underlying the observed dynamics, including why systems remain stable under some conditions but develop complex behavior under others. These insights helped identify the physical processes and parameters that most strongly influence system behavior. This research has applications in semiconductors, desalination processes, microfluidics, batteries, and related technologies.

Dr. Lee's technical expertise includes:

- **Statistical Modeling and Machine Learning:** Regression, classification, neural networks, time-series analysis, and ensemble methods.
- **Mathematical Modeling:** Deterministic and stochastic differential equations and continuous and discrete dynamical systems.
- **Data Analysis, Visualization, and Simulation:** Analysis of experimental and simulated data and development of interpretable visualizations that reveal important patterns and trends.
- **Scientific Computing:** Development and implementation of computational analyses using Python and Mathematica.
- **Model Validation and Sensitivity Analysis:** Evaluation of model performance, assumptions, and sensitivity to inputs and parameters.

Beyond technical rigor and efficiency, Dr. Lee is passionate about communicating complex concepts clearly and concisely to technical and nontechnical audiences. He has extensive undergraduate teaching

experience and enjoys helping individuals with varied technical backgrounds understand sophisticated analytical methods and results. His interdisciplinary approach enables him to translate complex datasets and physical mechanisms into clear, defensible insights that support technical and strategic decision-making.

Academic Credentials & Professional Honors

Ph.D., Applied and Computational Mathematics, Princeton University, 2023

M.A., Applied and Computational Mathematics, Princeton University, 2020

B.A., Mathematics, University of Chicago, 2015

Prior Experience

Postdoctoral Researcher, Vanderbilt University, Department of Mathematics, 2023–2026

Lecturer, Princeton University, 2023

Graduate Teaching Assistant, Princeton University, 2019–2023

Publications

Lee F-N. global regularity of dilute solutions of three-dimensional multispecies Nernst-Planck systems. Preprint 2026.

Du H, Lee F-N, Simonett G. global existence of weak solutions to a nematic electrolytes model in 2D. Preprint 2026.

Du H, Lee F-N, Simonett G. On nematic electrolytes. Preprint 2026.

Lee F-N. Existence, uniqueness, and regularity of nonequilibrium steady states in multispecies ion transport. Nonlinear Analysis: Real World Applications 2026.

Lee F-N. Stability of weak electrokinetic flow. journal of mathematical fluid mechanics. Journal of Mathematical Fluid Mechanics 2025; 27(15).

Abdo E, Lee F-N. Logarithmic Sobolev inequalities for bounded domains and applications to drift-diffusion equations. Journal of Functional Analysis 2024.

Lee F-N. Long time dynamics of nonequilibrium electroconvection. Transactions of the American Mathematical Society 2024.

Abdo E, Lee F-N, Wang W. On the global well-Posedness and analyticity of some Electrodiffusion models in ideal fluids and porous media. SIAM Journal on Mathematical Analysis 2023.

Constantin P, Ignatova M, Lee F-N. Existence and stability of nonequilibrium steady states of Nernst-Planck-Navier-stokes systems. Physica D: Nonlinear Phenomena 2022.

Lee F-N. Global regularity for Nernst-Planck-Navier-stokes systems with mixed boundary conditions. Nonlinearity 2022.

Constantin P, Ignatova M, Lee F-N. Nernst-Planck-Navier-stokes systems near equilibrium. Pure and Applied Functional Analysis 2022.

Constantin P, Ignatova M, Lee F-N. Interior electroneutrality in Nernst-Planck-Navier-stokes systems. Archive for Rational Mechanics and Analysis 2021.

Constantin P, Ignatova M, Lee F-N. Nernst-Planck-Navier-stokes systems far from equilibrium. Archive for Rational Mechanics and Analysis 2021.

Presentations

Lee F-N. Electroconvective stability. Oral Presentation, 45th Annual Western Kentucky University Mathematics Symposium, Bowling Green, KY, 2025.

Lee F-N. Stability of weak electrokinetic flow. Invited Talk, AMS Spring Central Sectional Meeting, Lawrence, KS, 2025.

Lee F-N. Global stability of electrokinetic flow. Invited Talk, University of Pittsburgh PDE and Analysis Seminar, Pittsburgh, PA, 2025.

Lee F-N. Equilibrium dynamics in electroconvection. Invited Talk, AMS Fall Central Sectional Meeting, San Antonio, TX, 2024.

Lee F-N. Equilibrium dynamics in electroconvection. Invited Talk, University of Wisconsin–Madison PDE/Geometric Analysis Seminar, Madison, WI, 2024.

Lee F-N. Long time dynamics in electroconvection. Invited Talk, University of California, Santa Barbara Applied Math/PDE/Data Science Seminar, Santa Barbara, CA, 2024.

Lee F-N. A mathematical study of electroconvection. Invited Talk, Vanderbilt University, PDE Seminar, Nashville, TN, 2023.

Lee F-N. On nonequilibrium electroconvection. Invited Talk, AMS Spring Southeastern Sectional Meeting, Atlanta, GA, 2023.

Lee F-N. On nonequilibrium electroconvection. Oral Presentation, Princeton University PACM Colloquium, Princeton, NJ, 2023.

Lee F-N. Long time behavior of Nernst-Planck-Navier-stokes systems. Oral Presentation, AMS Fall Eastern Sectional Meeting, Amherst, MA, 2022.

Lee F-N. Long time behavior of the Nernst-Planck-Navier-stokes system on a bounded domain. Invited Talk, University of Arizona Early Career Math Colloquium, Tucson, AZ, 2022.

Lee F-N. On the Nernst-Planck-Navier-stokes system. Oral Presentation, Joint Mathematics Meetings, Seattle, WA, 2022.

Lee F-N. On the Nernst-Planck-Navier-stokes system. Oral Presentation, AMS Fall Western Sectional Meeting, Albuquerque, NM, 2021.

Lee F-N. Nernst-Planck-Navier-stokes system. Invited Talk, University of Southern California PDE & Analysis Seminar, Los Angeles, CA, 2021.

Research Grants

AMS-Simons Travel Award, American Mathematical Society and Simons Foundation. 2024–2026.

Peer Reviews

Reviewer, SIAM Journal on Applied Mathematics

Reviewer, Nonlinearity

Reviewer, Communications in Mathematical Physics

Reviewer, Communications in Partial Differential Equations

Reviewer, Ionics

Reviewer, Journal of Geometric Analysis