# David A. Lee

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## Research and Project Experience

- **First Prize Winning Team, "Harnessing Machine Learning to Improve Subseasonal-to-Seasonal Climate Predictions" Hackathon hosted by Columbia University Center Learning the Earth with Artificial Intelligence and Physics (LEAP), Amazon Web Services, and NVIDIA**
  - Employed PyTorch to investigate feasibility of LSTM and diffusion models in predicting future global climate trends at the monthly temporal scale
  - Achieved lowest root mean square error in predicting terrestrial and sea surface temperatures
- **Columbia University Center for Learning the Earth with Artificial Intelligence and Physics (LEAP)** | **Researcher** Sep. 2024 - present
  - **PI:** Dhruv Balwada
  - Investigated dimensionality reduction by way of neural implicit flows (NIFs), and benchmarking against established techniques like singular value decomposition (SVD) and convolutional autoencoders (CAEs)
  - Employed LEAP Pangeo Jupyter Hub for high-performance computing tasks in replicating outcomes using NIFs
  - Studied academic literature on submesoscale ocean dynamics
- **Stony Brook University, SUNY, School of Marine and Atmospheric Sciences** | **Researcher** Aug. - Dec. 2024
  - **Project:** *Identifying causality between the Atlantic Meridional Overturning Circulation (AMOC) and Poisson parameters for hurricane genesis frequency*
  - **PI:** Ping Liu
  - Employed 119 GB of reanalysis and hurricane formation data from the European Centre for Medium-Range Weather Forecasts and NOAA National Hurricane Center
  - Used SciPy, Tropycal, and statsmodels to construct Granger causality testing between sea surface temperature in the North Atlantic basin and hurricane formation frequency
- **University of Washington, School of Oceanography** | **Data Science in Oceanography** | **Researcher** Aug. 2024
  - Tutorials under Professor Georgy Manucharyan and University of Washington faculty in physical, biological, chemical, geological, and machine learning tools in oceanography
  - Used Xarray, cartopy, and Matplotlib to create animated maps of ocean buoy data and wind speeds
  - Employed machine learning tools in TensorFlow to apply random forest and Gaussian mixture models to phytoplankton classification
  - Cleaned netCDF files from the Spotter global buoy network and European Centre for Medium-Range Weather Forecasts ERA5 reanalysis datasets containing over 1.5 billion data points
- **Climatematch Academy** | **Researcher** July 2024
  - Training in the fundamentals of scientific computation for the earth sciences using Python and Xarray
  - Coursework in ocean and atmosphere reanalysis, remote sensing, paleoclimate, and modeling techniques in precipitation variability and extreme events, Arctic Sea ice change, heatwaves, and ocean acidification
- **NASA Goddard Institute for Space Studies** | **Research Intern** Summer 2017
  - **Project:** *Geometric Phase Sensitivity of an Array of Atom Ring Interferometers as Inter-Ring Distance is Modulated*
  - **PI:** John R.E. Toland
  - Primary objective was to study a theoretical method to make precise and sensitive measurements of rotation rates in a 1-D rotating chain of $N$ coherently coupled mesoscopic ring atom interferometers, each separated by an inter-ring distance $d$ and experiencing the Sagnac effect. Used MATLAB implemented with quadruple-precision to code the transmission function describing the propagation of matter waves in the system and modulated the inter-ring distance as a means of calculating such rotation rates, reducing computation time by over 99 percent from 5 hours to 5 seconds.

## Technical Skills

- **Languages:** Python (Xarray, cartopy, multiprocessing, pandas, NumPy, scikit-learn, SciPy, statsmodels, TensorFlow, Matplotlib), R, MATLAB, Lisp (Racket), HTML, CSS, JavaScript, LaTeX
- **Text Editors:** Vim, Microsoft Visual Studio Code

## Professional Experience

- **Adelphi University** | **Robert B. Willumstad School of Business** | **Adjunct Professor of Economics** Aug. - Dec. 2024
  - Taught undergraduate courses in microeconomics and money and banking systems
  - Custom-built curriculum including syllabi, slide decks, homework and essay assignments, and exams
  - Built rapport with students, facilitated teamwork in group activities, and routinely provided guidance on academic and professional career
- **OnePointFive Academy Sustainablity Consultant Accelerator** | **Fellow** July 2024
  - Participant in the Cohort 5 OnePointFive Academy Sustainability Consultant Accelerator program
- **Climatebase** | **Fellow** Mar. 2024 - present
  - Selected out of thousands of applicants as a participant in the Cohort 5 Climatebase Fellowship program
- **DirtSat** | **Independent Contractor** Dec. 2023 - Mar. 2024
  - Developed statistical model using Python (Pandas, NumPy) projections of energy consumption levels of buildings with biosolar rooftop implementations
- **New York State Assembly, Office of Assemblymember Ron Kim** Sep. 2019 - Jan. 2024
  - **Legislative Director** Jan. 2020 - Jan. 2024
    - Conducted legal and policy research and analysis in the development of legislation, policy papers, memoranda, correspondences, and op-eds for the Member
    - Routinely met with stakeholders in discussing legislative priorities
    - Directed teams of interns on research projects and facilitated collaboration between other legislative offices
    - Extensively researched and co-authored papers to prepare Assembly bills A.10840 and A.3397, first of which was passed by the NYS Legislature and signed into law by Governor Andrew M. Cuomo on August 3, 2020, and the second, signed into law on April 6, 2021
    - Investigated and authored research on the anti-labor legal methods employed by a local nonprofit home care agency, which received media coverage from The American Prospect, New York Focus, and local news outlets
  - **Community Liaison** Sep. - Dec. 2019
    - Conducted Korean-language constituent services for Flushing residents

## Volunteer Experience

- **ML Mentor, Columbia University Center for Learning the Earth with Artificial Intelligence and Physics (LEAP)** January 2025
  - Assisted in teaching students about deploying convolutional neural nets on climate data in Python using Xarray and TensorFlow

## Education

- **John Jay College, City University of New York** 2021 - 2023
  - **Major:** M.A. Economics (GPA: 4.0)
- **Queens College, City University of New York** 2015 - 2017
  - **Major:** B.A. Pure Mathematics (Major GPA: 3.93, Overall GPA: 3.89)

## Certifications

- **LEAP Momentum Bootcamp in Climate Data Science** January 2024
  - Learned machine learning tools using Python's Xarray and TensorFlow capabilities to model ocean salinity and global atmospheric temperatures over long time horizons

## Non-degree Coursework

- **State University of New York (SUNY) at Stony Brook**
  **School of Marine and Atmospheric Sciences** Fall 2024
  - Coursework in Weather and Climate Data Analysis (ATM 387)
- **Columbia University in the City of New York**
  **The Fu Foundation School of Engineering and Applied Science** 2017 - 2018
  - Completed 13 credits as student in the Applied Physics and Applied Mathematics (APAM) Department