# Marianne Arriola

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## Research Experience

**Rotation PhD researcher**
*Kuleshov Group, Cornell Tech — Prof. Volodymyr Kuleshov*
2/24 – 5/24
I am advancing a novel framework to fine-tune powerful, pre-trained masked language models to have generative capabilities using a diffusion-based learning objectives. I applied these strategies to fine-tune DNA language models that generate novel sequences.

**Rotation PhD researcher**
*Institute of Artificial Intelligence for Digital Health, Weill Cornell Medicine — Prof. Fei Wang*
9/23 – 2/24
I developed the first machine learning framework that can integrate heterogeneous single-cell features across diverse modalities and cohorts without strict assumptions on data availability.

**Undergraduate Researcher**
*Dynamo Lab, UCSB — Prof. Ambuj Singh*
9/21 – 5/23
I designed an architecture to detect multi-scale anomalies in attributed networks by using graph autoencoders with multi-scale spectral filters to learn node representations at different scales.

**MIT Summer Research Program Fellow**
*Geometric Data Processing Group, MIT — Prof. Justin Solomon*
6/22 – 11/22
I advanced an efficient and robust 3D vision architecture that incorporates geometric shape information to learn from point cloud data relevant in object detection for autonomous cars.

**Caltech WAVE Fellow**
*Arnold Lab, Caltech — Prof. Frances Arnold*
6/21 – 8/21
I developed graph machine learning models to predict a protein's functional capacity and search for proteins with high function by leveraging a graph representation of protein structure.

## Work Experience

**Undergraduate Learning Assistant & Program Lead**
*UCSB*
9/21 – 6/23
I mentored students in both introductory and advanced computer science classes and facilitate instructors in designing and executing course learning objectives. As a program lead, I contribute to hiring, training, and coordinating learning assistants in maintaining and improving the teaching program.

**Peer Mentor**
*Summer Institute in Mathematics and Science, UCSB*
8/22 – 9/22
I mentored rising UCSB freshmen from underrepresented backgrounds interested in pursuing

STEM research. I fostered their career, academic, and research development by coordinating events and workshops to prepare them for success at UCSB and beyond.

**Recruiting Assistant**
*College of Creative Studies Computing, UCSB*
3/21 – 5/21
I coordinated outreach to students admitted into the Computing major by connecting prospective students to current students for mentorship in an effort to diversify the program.

## Publications

Sahoo, S., **Arriola, M.,** Gokalsan, A., Marroquin, E.M., Schiff, Y., Chiu, J., Rush, A., Kuleshov, V. Likelihood-Based Masked Diffusion Language Models With A Rao-Blackwellized ELBO. *In submission to NeurIPS*, May. 2024.

**Arriola, M.,** Pan, W., Zhou, M., Zhang, Q., Su, C., Wang, F. Joint Analysis of Single-Cell Data across Cohorts with Missing Modalities. *In submission to KDD*, Feb. 2024.

**Arriola, M.** & Johnston, K. Identifying Optimal Proteins by Their Structure Using Graph Neural Networks. *Caltech Undergraduate Research Journal '22*, Jun. 2022.

## Conference Presentations

**Arriola, M.,** Kadina, J., Arnold, F. Identifying Optimal Proteins by Their Structure Using Graph Neural Networks. College of Creative Studies Research and Creative Activities Conference, Nov. 2021.

**Arriola, M.*,** Huang, X.*, Wang, Y., Guizilini, V.C., Ambrus, R.A., Solomon, J. Geometry-Aware Point Cloud Learning for Robust and Efficient 3D Vision. College of Creative Studies Research and Creative Activities Conference, Nov. 2022.

## Patents

**Arriola, M.*,** Huang, X.*, Wang, Y., Guizilini, V.C., Ambrus, R.A., Solomon, J. Hybrid Geometric Primitive Representations for Point Clouds. U.S. patent pending.

## Education

**Cornell University**
Computer Science Ph.D. student at Cornell Tech
Sept. 2023 – Expected June 2029 — Graduate School Dean's Scholar

**University of California, Santa Barbara**
Computing B.S., College of Creative Studies
June 2023 — Cumulative GPA: 3.89

## Programming Skills

- Python: Implemented geometric deep learning models in TensorFlow and PyTorch
- R: Implemented a Dirichlet-Multinomial Model to infer communities in microbial data and Markov chain Monte Carlo algorithm analysis for state redistricting
- JavaScript: Created a biological multi-access key with a Prolog and Node.js backend and a Vanilla JS frontend

- MATLAB: Modeled a dynamic genetic circuit
- Java: Created a protein translation program
- C: Designed a virtual machine from scratch
- C++: Completed several courses in C++
- Bash: Created a pipeline for preprocessing neuroimaging data
- React JS: Designed web portfolios

## Awards

**NSF Graduate Research Fellowship**
National Research Foundation — 3/23
5-year fellowship for the graduate education of individuals who have demonstrated their potential for significant research achievements in STEM or STEM education.

**Hopper-Dean / Bowers CIS Deans Excellence Fellowship**
Cornell University — 2/23
2-year fellowship for graduate students admitted into the Dean's Scholar program.

**Barry Goldwater Scholarship**
The Barry Goldwater Scholarship Foundation — 3/22
National scholarship awarded to undergraduates pursuing careers in STEM fields who demonstrate outstanding academic performance and potential in research.

## Activities

**MIT Summer Research Program Application Reviewer**
1/24 – 2/24
I volunteered as an application reviewer for the MIT undergraduate research program that encourages undergraduates from underrepresented backgrounds to pursue graduate education.