

# Annabel Large

Email: annabel [underscore] large [at] berkeley [dot] edu

Specializing in machine learning and artificial intelligence for biological applications,  
with extensive experience in teaching and community organization

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**EDUCATION**      **University of California (UC), Berkeley**, Berkeley, CA      **2020 - Present**  
**University of California, San Francisco (UCSF)**, San Francisco, CA  
**PhD Thesis Advisor:** Prof. Ian Holmes  
UC Berkeley - UCSF Graduate Program in Bioengineering

**Relevant Coursework:**

Bioeng 245: Introduction to Machine Learning for Computational Biology  
Bioeng 241: Probabilistic Modeling in Computational Biology  
CS 289A: Introduction to Machine Learning  
CS 288: Natural Language Processing

**University of Tennessee at Knoxville (UTK)**, Knoxville, TN      **2014 - 2019**  
B.S., Chemical Engineering

**SKILLS**      **Languages:** Python (Jax, Pytorch for deep learning), Unix/bash scripting

**Specialization:** probabilistic modeling, deep learning, ML/AI, stochastic models of  
sequence evolution, protein informatics

**AWARDS**      Hearts to Humanities Fellowship      2024  
NVidia Hardware Grant Recipient      2022  
UC Berkeley Bioengineering Brodie Endowed Fellowship      2022  
National Science Foundation Graduate Research Fellowship      2021, 2019  
Program; Honorable Mentions  
Fulbright Research Scholar; Sweden      2019

**EMPLOYMENT**      **University of California, Berkeley**, Berkeley, CA      **June 2021 - Present**  
*PhD Student, UC Berkeley - UCSF Graduate Program in Bioengineering*  
*Expanding Protein Indel Models with Classical Mixtures and Deep Learning*  
PhD Thesis Advisor: Prof. Ian Holmes  
Department of Bioengineering

**University of California, Berkeley**, Berkeley, CA      **Aug 2020-June 2021**  
*PhD Rotations, UC Berkeley - UCSF Graduate Program in Bioengineering*  
Rotation 1: Prof. Christoph Kirst, *Computational Theoretical Neuroscience*  
Rotation 2: Prof. Priya Moorjani, *Causal Variant Discovery for South Asian Populations*  
Rotation 3: Prof. Ian Holmes, *Machine learning for Directed Evolution of Proteins*

**Swedish University of Agricultural Sciences, Alnarp, Sweden**      **Aug 2019-May 2020**  
*Swedish Fulbright Research Student, Bioinformatics*  
*Network-based Multi-omic Data Integration for Exploration of Potato Plant Immunity Pathways*

## CITATIONS

### Papers, Preprints:

**LARGE, A.**, Holmes, I. “Nested birth-death processes are competitive with parameter-heavy neural networks as time-dependent models of protein evolution”. BioRxiv (2026).

Resjö, S., Willforss, J., **LARGE, A.**, Siino, V., Alexandersson, E., Levander, F., Andreasson, E. “Comparative proteomic analyses of potato leaves from field-grown plants grown under extremely long days.” *Plant Physiology and Biochemistry* (2024).

Olayide, P., **LARGE, A.**, Stridh, L., Rabbi, I., Baldermann, S., Stavolone, L., Alexandersson, E. “Gene Expression and Metabolite Profiling of Thirteen Nigerian Cassava Landraces to Elucidate Starch and Carotenoid Composition.” *Agronomy* (2020)

Kelley, B., Ellis, J., **LARGE, A.**, Schneider, L., Jacobson, D., Johnson, J. “Whole-Genome Sequencing and Bioinformatic Analysis of Environmental, Agricultural, and Human *Campylobacter jejuni* Isolates From East Tennessee.” *Frontiers in microbiology* 11 (2020)

Furches, A., Kainer, D., Weighill, D., **LARGE, A.**, ..., Jacobson, D. “Finding cell wall regulatory mechanisms through multiple lines of evidence.” *Frontiers in Plant Sciences* (2019).

### Invited Talks:

**LARGE, A.**, Holmes, I. “Nested birth-death processes are competitive with parameter-heavy neural networks as time-dependent models of protein evolution.”

- Probabilistic Modeling in Genomics 2026, Berkeley, CA, USA (2026).
- Mathematical and Computational Evolutionary Biology, Crete, Greece (2026).
- The Annual Meeting of the Society for Molecular Biology and Evolution, Copenhagen, Denmark (2026).

**LARGE, A.**, Holmes, I. “Fitting Indel Evolution Model Parameters to PFam Protein Alignments with a GPU-accelerated Framework.” *LEGEND 2024*, Crete, Greece (2024).

**LARGE, A.**, Weighill, D., Joubert, W., Furches, A., Kainer, D., Jones, P., Podar, M., Jacobson, D. “Network-based Approaches in the Analyses of the Oral Microbiome.” *INFORMS Computing Society Conference*, Knoxville, TN (2019).

## TEACHING

### **BioEng 10: Introduction to Bioengineering**

**Aug-Dec 2024**

*University of California, Berkeley*

*Head Instructor: Prof. Iain Clark*

*Role: Graduate Student Instructor*

- Taught 100 undergraduate students across 3 classes per week
- Created lecture materials and practice problems for all 300 undergraduate students across all BioEng 10 classes
- Curated academic papers for midterm assignment, responsible for 10% of students grades

### **Center for Computational Biology: Python bootcamp**

**2022, 2024**

*University of California, Berkeley*

*Role: Teaching Assistant*

- Assisted undergraduate students, graduate students, and industry partners in python bootcamp assignments, spanning one week of material
- Taught at 4 bootcamps across 2 years

### **Accelerating climate resilient plant breeding by applying –omics and artificial intelligence**

**April 20-24, 2020**

*Swedish University of Agricultural Sciences, Alnarp, Sweden*

*Head Instructor: Prof. Erik Alexandersson*

*Role: Guest Instructor*

- Created hands-on software demonstration and corresponding student assignment for identifying differentially expressed genes (in R programming language)

## SERVICE

### **BioE Admissions Committee**

**Dec 20xx, 20xx**

*Selecting the next class of PhD students for the UC Berkeley - UCSF Graduate Program in Bioengineering (numbers redacted, contact for more information)*

- Screen ~x applicants per cycle
- Collaborate across the department to select best candidates

### **BioE Retreat Committee Co-Chair**

**Jan 2022-Jan 2023**

*Co-lead organization of the 2022 BioE Department Retreat, the first in-person retreat after COVID pandemic*

- Created programming for +250 students, staff, and faculty across 3 days
- Coordinated and activities for nine different student subcommittees; served as committee liaison to BioE department admin and faculty
- Personally responsible for registration, transportation, and catering
- In coordination with the Diversity, Equity, Inclusion, and Belonging (DEIB) Committee and Faculty Executive Committee, initiated a new “State of DEIB in Bioengineering” talk