

# Mariana Harris

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## EDUCATION

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**University of California, Los Angeles**

**2019 – present**

*Ph.D. Biomathematics*

Advisor: Nandita Garud

**Instituto Tecnológico Autónomo de México (ITAM)**

**2014 – 2018**

*B.S. Applied Mathematics - Summa Cum Laude*

Advisor: Víctor F. Breña Medina

Thesis: Mathematics Modeling of Quorum Sensing Dynamics

## RESEARCH EXPERIENCE

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**University of California, Los Angeles**

**2019 – present**

*Ph.D. candidate*

*Prevalence of hard and soft sweeps in natural populations.*

Advisor: Nandita Garud.

I use statistics, machine learning and computational population genomics to detect signatures of positive selection in genomic data. I have worked on quantifying the rapidity of adaptation by detecting selective sweeps and classifying them as either hard or soft with applications in *Drosophila* and ancient DNA.

**Iowa State University**

**Summer 2017**

*Math NSF Research Experience for Undergraduates (REU)*

*A Limiting Strategy for Locally-Implicit Lax-Wendroff DG Methods.*

Advisors: Dr. James A. Rossmanith and Caleb Logemann.

Implemented method and applied positivity and slope limiters to solve nonlinear PDEs.

**Harvard University**

**Summer 2016**

*Research Experience for Undergraduates (REU)*

*DNA Helix Bundle Self-Assembly.*

Advisors: Dr. Michael Brenner, Hidenori Tanaka, Martin Falk

Developed a computational model of the process of self-assembly to provide experimentalists with a tool to obtain information on parameters involved in DNA self-assembly at the nanoscale level.

## AWARDS

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UCOP Dissertation Year Award (UCOP DY A)

**2024-2025**

DeLill Nasser Travel Award	Fall 2023
Best poster award QCBio Retreat 2023 UCLA	September 26, 2023
Outstanding mentorship award BIG summer 2022 UCLA	Summer 2022
NIH/UCLA Genomic Analysis Training Grant (T32)	2021-2023
Sotero Prieto Prize 2020, <i>honorary mention</i> <i>Awarded by the Mexican Mathematical Society to the most outstanding undergraduate thesis in Mathematics.</i>	2021
NIH Systems and Integrative Biology Training Grant (T32)	2019 - 2021

## PUBLICATIONS

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\* denotes equal contribution.

**Harris M.**, Kim B., and Garud N. Enrichment of hard sweeps on the X chromosome compared to autosomes in six *Drosophila* species (2024). *Genetics*. <https://doi.org/10.1093/genetics/iyae019>

Pandey D.\*, **Harris M.**\*, Garud N. and Narasimhan V. Understanding natural selection in the European Holocene using multi-locus genotype identity scans (2023). *BioRxiv*  
<https://doi.org/10.1101/2023.04.24.538113>

**Harris M.** and Garud N. Enrichment of hard sweeps on the X chromosome in *Drosophila melanogaster* (2023). *Mol Biol Evol*. <https://doi.org/10.1093/molbev/msac268>

## TEACHING AND MENTORING

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<b>TA, Molecular Evolution (EEB 121)</b> UCLA	Fall 2023
<b>Graduate research mentor</b> <i>Bruin in Genomics (BIG) summer program UCLA</i> I was a mentor for the BIG summer research program at UCLA, a program that seeks to provide research experience in quantitative biology to undergraduate students.	Summer 2022
<b>Undergraduate Faculty of Mathematics</b> <i>Instituto Tecnológico Autónomo de México (ITAM)</i> The department of Mathematics selects junior and senior students of academic excellence to tutor and provided academic support for students struggling on any of the courses offered by the department of mathematics.	2017 - 2018

## PRESENTATIONS

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<b>TAGC 2024 – talk</b> <i>Enrichment of hard sweeps on the X chromosome relative to</i>	March 7, 2024
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*autosomes in six Drosophila species.*

**QCBio Retreat 2023 (UCLA) – poster**

*Enrichment of hard sweeps on the X chromosome relative to autosomes in six Drosophila species.*

*September 21, 2021*

**SCALE 2023 – talk**

*Enrichment of hard sweeps on the X chromosome relative to autosomes in six Drosophila species.*

*May 20, 2023*

**SMBE everywhere 2023 GS10 – talk**

*Enrichment of hard sweeps on the X chromosome relative to autosomes in six Drosophila species.*

*April 27, 2023*

**Drosophila 2023 – poster**

*Enrichment of hard sweeps on the X chromosome relative to autosomes in six Drosophila species.*

*March 2, 2023*

**PEQG 2022 – poster**

*Contrasting the Mode and Tempo of Adaptation on the X Chromosome and the Autosomes of D. melanogaster.*

*June 9, 2022*

**NHGRI Research Training and Career Development Annual Meeting (Duke) – poster**

*Contrasting the Mode and Tempo of Adaptation on the X Chromosome and the Autosomes of D. melanogaster.*

*April 4, 2022*

**QCBio Research seminar series (UCLA) – talk**

*Differences in the Signatures of Selection Between the Autosomes and the X Chromosome in D. melanogaster*

*November 10, 2021*

**QCBio Retreat 2021 (UCLA) – poster**

*Are Selective Sweeps on the X Chromosome Hard?*

*September 21, 2021*

**Instituto Tecnológico Autónomo de México (ITAM)**

**Math Colloquium - talk**

*Mathematical Modeling of Quorum Sensing Dynamics*

*May 14, 2019*

**National Young Researchers in Mathematics Meeting at Universidad Mexicana Autónoma de México- poster**

*Positivity and Slope Limiters for Locally-Implicit Lax-Wendroff Discontinuous Galerkin Methods.*

*February 19-22, 2018*

**Joint Mathematics Meeting (JMM) 2018 – poster**

*Positivity and Slope Limiters for Locally-Implicit Lax-Wendroff Discontinuous Galerkin Methods.*

*January 12, 2018*

**International Linear Algebra Society (ILAS) 2017**

**Conference – poster**

*Positivity and Slope Limiters for Locally-Implicit Lax-Wendroff*

*July 24, 2017*

*Discontinuous Galerkin Methods.*

## OTHER PROFESIONAL ACTIVITIES

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Reviewer for:

*Molecular Ecology, Nature Ecology and Evolution, PLoS Genetics, Genetics*

## ORGANIZATIONS

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**Biological Sciences Council**

*UCLA*

Computational medicine student representative.

*September 2022 – present*

**Justice, Equity, Diversity and Inclusion (JEDI) committee  
for computational medicine.**

*UCLA*

Graduate Student Representative

*September 2022 – present*

**Math student's Representation**

*Instituto Tecnológico Autónomo de México (ITAM)*

Head of academic committee.

*2016-2017*

**Laberinto & Infinitos**

*Instituto Tecnológico Autónomo de México (ITAM)*

Mathematics Student's Journal editor.

*January 2018 - October 2018*

## OUTREACH

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**UCLA Explore your Universe Science Fair**

*Science fair volunteer*

*October 2022*

**San Bernardino, Inyo, and Mono Counties elementary  
and middle school Science & Engineering Fair**

*Science fair judge*

*2022, 2023*

**How to apply to Summer Research Programs for  
Undergraduates (talk)**

*Instituto Tecnológico Autónomo de México (ITAM)*

*September 2017*

**Applying to Summer Research Programs and Graduate  
School in the US (talk)**

*Instituto Tecnológico Autónomo de México (ITAM)*

*August 2019*