Benjamin **Chu**

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"Expertise in Mathematics, Statistics, Software Engineering, and Quantitative Biology"

Research Interests

Math and Statistics Penalized regression methods, Generalized linear models, Variance component models

Computation Parallel and High-Performance Computing, Big Data Analysis, Package Development

Biology Genome-Wide Association Studies, Phasing and imputation, admixture estimation

Education

University of California, Los Angeles — *Los Angeles, California*

Ph.D Biomathematics — *09/2016 - 06/2021 (expected)*

- Advisors: Kenneth Lange and Janet Sinsheimer
- Expected graduation: 6/1/2020

University of California, Berkeley — *Berkeley, California*

B.A., Applied Mathematics — *09/2012 - 05/2016*

Publications

A Fast Data-Driven Method for Genotype Imputation, Phasing, and Local Ancestry Inference: MendelImpute.jl — *Under review*

Benjamin B. Chu, Eric M. Sobel, Rory Wasiolek, Janet S. Sinsheimer, Hua Zhou, Kenneth Lange — *October, 2020*

Iterative Hard Thresholding in GWAS: Generalized Linear Models, Prior Weights, and Double Sparsity — *GigaScience*

Benjamin B. Chu, Kevin L. Keys, Chris A. German, Hua Zhou, Jin J. Zhou, Janet S. Sinsheimer, Kenneth Lange — *June, 2020*

OpenMendel: A Cooperative Programming Project for Statistical Genetics — *Human Genetics*

Zhou H, Sinsheimer J, Bates D, **Chu B**, German C, Ji S, Keys K, Mosher G, Papp J, Sobel E, Zhai J, Zhou J, Lange K — *March, 2019*

An Efficient Protocol for Computing the pKa of Zn-Bound Water — *Physical Chemistry Chemical Physics*

Cedric Grauffel, **Benjamin Chu**, Carmay Lim — *November, 2018*

Experiences

Google Summer of Code — *NumFOCUS - Julia Cohort*

Student software developer — *Summer 2018*

- An unique summer program where students work on self-proposed open source projects
- Added 3 additional features to IHT.jl to integrate it with the Open Mendel umbrella program

Academia Sinica — *Institute of Biomedical Sciences*

Research assistant with Prof Carmay Lim — *Summer 2014, 2015, 2016*

- One publication: An Efficient Protocol for Computing the pKa of Zn-Bound Water
- Using computational approaches to model drug-protein and drug-environment interactions

Public Talks

Scalable algorithms for genetic association studies, genotype imputation, and ancestry inference — *University of Southern California*

University of Southern California, Biostatistics Seminar (online) — *January 28, 2021*

Scalable algorithms for GWAS, genotype imputation, and ancestry inference — *University of Michigan*

University of Michigan, Biostatistics Seminar (online) — *December 14, 2020*

Julia Meets Mendel: Algorithms and Software for Modern Genomic Data Analysis — *Online*

American Society of Human Genetics Virtual Meeting 2020 — *October 27-30, 2020*

OpenMendel Programming Workshop — *University of California, Los Angeles*

Inaugural Lange Symposium — *February 22, 2020*

A Multiple Regression Approach for GWAS and High Dimensional Inference — *University of California, Los Angeles*

Quantitative and Computational Biosciences Research Lunch — *February 8, 2020*

MendelIHT.jl: Generalized Linear Models for High Dimensional Genetics (GWAS) Data — *University of Maryland Baltimore*

JuliaCon 2019, available at: www.youtube.com/watch?v=UPIKafShwFw — *July 25, 2019*

Teachings

Bruins-In-Genomics (B.I.G) summer research program — *UCLA*

Graduate student mentor — *Summer 2018, 2019, 2020*

- Mentors 2 undergraduates for 8 weeks each summer.
- Proposed student projects. Reviewed student code. Guided them through technical aspects of genetics research.

Math 98 and 198 course — *UC Berkeley*

Undergraduate student instructor — *2013 - 2016*

- Taught 7 semesters of beginner/advanced Rubik's cube course (2 units), with about 15 students per semester.
- Average instructor rating 4.8/5.0

Honors & Awards

Followships and Scholarships

2019	**JuliaCon Financial Assistance for Travel**,	*Baltimore, MD*
2019	**Doctoral Student Travel Grant**,	*Pisa, Italy*
2018	**JuliaCon Financial Assistance for Travel**,	*London, UK*
2018	**Genomics Analysis Training Grant (T32)**,	*NIH/UCLA*
2016	**University Fellowship**,	*UCLA*
2016	**Registration Fee grant**,	*UCLA*

Miscellaneous

2017	**Certified in lifeguarding, first aid, AED, and CPR.**,	*Amer. Red Cross*
2015	**International inter-univeristy cube relay**, 10th place	*Cal Cube Club*
2014	**UC Berkeley semester Go (Weiqi) Tounament**, 1st place	*UCB Go Club*
2013	**3 by 3 rubik's cube speedsolve (10.52 seconds)**, 144th place in U.S, 910th in world	*WCA*

Notable softwares

MendelImpute.jl *Github Repository*

Julia package for genotype imputation, phasing, and admixture estimation

- https://github.com/OpenMendel/MendelImpute.jl

VCFTools.jl *Github Repository*

Julia utilities for handling VCF (variant call format) files

- https://github.com/OpenMendel/VCFTools.jl

MendelIHT.jl *Github Repository*

Iterative hard thresholding as a multiple regression model for analyzing GWAS data

- https://github.com/OpenMendel/MendelIHT.jl

Thyrosim.jl *Github Repository*

Thyroid system feeback simulator

- https://github.com/biona001/Thyrosim.jl

Skills

Applied courses	Convex optimization, MM optimization, numerical linear algebra, statistical computing, linear statistical models, continuum mechanics, deterministic models, stochastic models, biomedical data analysis, data structures
Pure math courses	Linear algebra, abstract algebra, algebraic geometry, real analysis, complex analysis, numerical analysis, probability, combinatorics, partial differential equations
Biology courses	Human genetics, Population genetics, Molecular/cell/developmental biology, Biochemistry & molecular biology, biology of HIV, evoluationary biology
Programming Languages	Julia (preferred), MATLAB, Python, Java, R, LaTeX, Bash, Git
	English, Mandarin Chinese, Japanese