

Mario Banuelos

Department of Mathematics,
College of Science and Mathematics
California State University, Fresno
5241 N Maple Ave, Fresno, CA 93740

mbanuelos22@csufresno.edu
mbgmath.com

EDUCATION

Ph.D., Applied Mathematics, 2018

University of California, Merced, Research Advisor: Prof. Suzanne Sindi

Preliminary Mathematics Teaching Credential, 2013

California State University, Bakersfield, 2013

B.A., Mathematics, 2012

California State University, Fresno, 2012

CURRENT AND FORMER POSITIONS

- **Assistant Professor**, Mathematics, College of Science and Mathematics, Fresno State, 2018 – *Present*
- **Post-Doctoral Researcher**, Mathematical Sciences Research Institute - Undergraduate Program (MSRI-UP) in Mathematical Data Science, Summer 2018
- **Genomics Graduate Intern**, Joint Genome Institute and University of California, Merced, Summer 2017

RESEARCH INTERESTS

Biostatistics, Genome Evolution in Populations, Optimization Methods in Computational Biology, Data Science, including

- Implementing and developing statistical and optimization methods to model and detect structural variations in genomic data of related individuals.
- Developing and applying machine learning methods for arbitrary architectures with applications in signal reconstruction of data corrupted by noise.

TEACHING INTERESTS

Applied Statistical Methods, Linear Algebra, Bioinformatics, Mathematical Biology, Machine Learning and Data Science

TEACHING EXPERIENCE

Assistant Professor, California State University, Fresno

Spring 2019 Applied Linear Statistical Models

Fall 2018/Spring 2019 Elementary Statistics

Fall 2018 Exploring Statistics

Teaching Assistant, University of California, Merced

Spring 2015-16/Fall 2016 Complex Analysis

Fall 2014, 2015 Linear Analysis

Fall 2013/Spring 2014 Calculus II for Physical Sciences and Engineering

Mathematics Teacher, Robert F. Kennedy High School,

Fall 2012/Spring 2013

Algebra I, California High School Exit Exam Math

PROFESSIONAL DEVELOPMENT AND OUTREACH

- Spring 2019-Present *MAA Project NExT Fellow (Silver '19)*
Professional development program fellow for Project NExT (New Experiences in Teaching), which focuses on teaching, research, service, and professional activity participation.
- Fall 2017- 2018 *BiotaQ Program Leadership*
Serving in a leadership position for this program, which focuses on developing Next Generation Science Standards (NGSS) STEM modules for secondary education. Both graduate and undergraduate students then deliver these after-school modules to Merced high school students.
- June 2016-2018 *DESCARTES Scholars Program Mentor*
Serving as a mentor for Applied Math Majors in this NSF-sponsored program to prepare students with the necessary tools to succeed in computational and data-enabled science careers.
- June 2015-2016 *DESCARTES Teacher Scholars Program*
Assisted in workshops for high school math teachers gaining experience with computational tools in Matlab and discussing opportunities for students in data science.
- Spring 2015/18 *Latinx in Mathematical Sciences Conference (hosted by IPAM)*
Organized a group of first-generation undergraduate students to attend and gain exposure to opportunities in graduate school, academia, industry, and government.

HONORS AND AWARDS

- 2017-2018 UC Merced Fletcher Jones Fellowship Recipient
- Honorable Mention - Ford Foundation Dissertation Fellowship 2017
- Certificates in General Pedagogy:
 - *Developing Teaching Strategies and Improving Teaching by Assessing Learning*, May 2015
 - *Mastering the Classroom with 1st Generation College Students*, February 2015
- Certificate in Undergraduate Learning Outcomes Assessment: Pedagogy and Program Planning, May 2014
- SACNAS 2015 Best Graduate Oral Presentation in Applied Mathematics, Oct. 2015
- *Gates Millennium Scholar*, August 2008 – August 2018
- *CSUB Edvention Fellow*, September 2012 – September 2013

PUBLICATIONS

Journal Articles

- M. Banuelos, S. Sindi, *Modeling Transposable Element Dynamics with Fragmentation Equations*, Mathematical Biosciences, 2018.

Proceedings

- O. DeGuchy, F. Santiago, M. Banuelos, and R. F. Marcia, *Deep neural networks for low-resolution photon-limited imaging*, Accepted to the 2019 IEEE International Conference on Acoustics, Speech, and Signal Processing.
- M. Spence, M. Banuelos, R. F. Marcia, and S. Sindi, *Detecting novel structural variation in genomes by leveraging parent-child relatedness*, Accepted to the 2018 IEEE International Conference on Bioinformatics & Biomedicine.
- M. Banuelos, S. Sindi, and R. F. Marcia, *Structural variant prediction in extended pedigrees through sparse negative binomial genome signal recovery*, Proceedings of 2018 International Conference of the IEEE Engineering in Medicine and Biology Society.
- M. Banuelos, S. Sindi, and R. F. Marcia, *Negative binomial optimization for biomedical structural variant signal reconstruction*, Proc. of 2018 IEEE International Conference on Acoustics, Speech and Signal Processing.
- M. Banuelos, L. Adhikari, R. Almanza, A. Fujikawa, J. Sahagún, K. Sanderson, M. Spence, S. Sindi, and R. Marcia, *Sparse diploid spatial biosignal recovery for genomic variation detection*, Proc. of the 2017 IEEE International Symposium on Medical Measurements and Applications (MeMeA).*
- M. Banuelos, L. Adhikari, R. Almanza, A. Fujikawa, J. Sahagún, K. Sanderson, M. Spence, S. Sindi, and R. Marcia, *Nonconvex regularization for sparse genomic variant signal detection*, Proc. of the 2017 IEEE International Symposium on MeMeA.*
- M. Banuelos, R. Almanza, L. Adhikari, S. Sindi, and R. Marcia, *Biomedical signal recovery: genomic variant detection in family lineages*, Proc. of the IEEE 5th Portuguese Meeting on Bioengineering.
- M. Banuelos, R. Almanza, L. Adhikari, S. Sindi, and R. Marcia, *Constrained Variant Detection with SPaRC: Sparsity, Parental Relatedness, and Coverage*, Proc. of the 2016 International Conference of the IEEE Engineering in Medicine and Biology Society.
- M. Banuelos, R. Almanza, L. Adhikari, S. Sindi, and R. Marcia, *Sparse genomic structural variant detection: exploiting parent-child relatedness for signal recovery*, Proc. of the 2016 IEEE Workshop on Statistical Signal Processing.
- M. Banuelos, R. Almanza, L. Adhikari, S. Sindi, and R. Marcia, *Sparse signal recovery methods for variant detection in next-generation sequencing data*, Proc. of the 2016 IEEE International Conference on Acoustics, Speech and Signal Processing.

* Indicates work done with Research Experiences for Undergraduates (REU) students at University of California, Merced supported by NSF Grant DMS 1359484.

Peer-Reviewed Abstracts

- M. Banuelos, H. Gatewood, S. Hood, J. Scott, and D. Uminksy. *TAct: optimal search through activation function space*. Accepted abstract in 1st Latinx in AI Workshop at Neural Information Processing Systems (NeurIPS), 2018.

- D. Uminsky, R. Garza, L. González, S. A. Nwakanma, S. Devlin, and M. Banelos. *Detecting higher order variable interactions: A spectral analysis*. Accepted abstract in 1st Latinx in AI Workshop at Neural Information Processing Systems (NeurIPS), 2018.

PRESENTATIONS

Invited Talks

Jan. 2019 M. Banelos, S. Sindi, and R. Marcia, *Mathematical -Omics Models in Error-Prone Data Regimes*, 2019 Joint Mathematics Meetings, Baltimore, MD

Contributed Talks

July 2016 M. Banelos, R. Almanza, L. Adhikari, S. Sindi, and R. Marcia, *Leveraging Sparsity To Detect Structural Variants in Genomic Data*, 2016 SIAM Conference on the Life Sciences, Boston, MA

Oct. 2015 M. Banelos, S. Sindi, *Modeling Size Distribution of Transposable Elements with Fragmentation Equations*, 2015 SACNAS National Conference, Washington, DC

July 2015 M. Banelos, S. Sindi, *Modeling Size Distribution of Transposable Elements with Fragmentation Equations*, 2015 Annual Meeting for the Society of Mathematical Biology, Atlanta, GA

Oct. 2014 M. Banelos, *Student Self-Assessment as a Learning Tool in Calculus*, UCSC Assessment Symposium, Santa Cruz, CA

Poster Presentations

Aug. 2018 M. Banelos, S. Sindi, and R. Marcia, *Constrained Optimization Methods for Detecting Related and Rare Genomic Rearrangements*, 2018 International Congress of Mathematicians (ICM), Rio de Janeiro, Brazil

Nov. 2017 M. Banelos, R. Almanza, L. Adhikari, S. Sindi, and R. Marcia, *Genetic Variants Over Generations: Sparsity-Constrained Optimization Tools for Structural Variant Detection*, 2017 Genome Informatics, Cold Spring Harbor, NY

Apr. 2016 M. Banelos, R. Almanza, L. Adhikari, S. Sindi, and R. Marcia, *Predicting Structural Variants In Genomic Data Using Sparsity and Relatedness Constraints*, Research in Computational Molecular Biology (RECOMB).

Mar. 2015 M. Banelos, S. Sindi, *Modeling the Size Distribution of Transposable Elements with Discrete and Continuous Fragmentation Equations*, 2015 UC Merced Research Week.

AFFILIATIONS

- Society for Industrial and Applied Mathematics (**SIAM**), Institute of Electrical and Electronics Engineers (**IEEE**), Latinx in Artificial Intelligence (AI) Coalition (**LXAI**), Society for Advancement of Chicanos/Hispanics and Native Americans in Sciences (**SACNAS**), Society of Mathematical Biology (**SMB**)