Dr. Bhaven A. Mistry

Contact Information

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Research Interests

Stochastic and nonlinear dynamic models of biological systems: mathematical biology; HIV infection; molecular evolution; chromosome folding; polymer physics; molecular dynamics simulation; physics of biological assays; biological swarms; mechanistic home-range analysis; support vector machines; image processing; 3D computer graphics modeling.

Academic Appointment

Assistant Director of the Murty Sunak Quantitative and Computing Lab and Visiting Assistant Professor August 2019 to present

Department of Mathematical Sciences, Claremont McKenna College

- Teaches a semester-long capstone course intended for undergraduates to work closely with industry sponsors on data science projects.
- Manages a tutoring center for mathematics, statistics, and computing needs of undergraduates.
- Presents workshops on data science and computer science topics.
- Provides faculty and student consultation for mathematical modeling and computational tools.

Education

University of California at Los Angeles, Los Angeles, CA
Ph.D., Biomathematics, August 2019
- Thesis Topic: *Stochastic Physics of Biological Assays and Improved Inference*
- Adviser: Professor Tom Chou

M.S., Biomathematics, February 2015

California State University at Northridge, Northridge, CA
M.S., Mathematics, August 2013
- Thesis Title: *Noise Induced State Transitions in 2D Interacting, Self-Propelled Particle Systems*
- Adviser: Professor Maria-Rita D'Orsogna

M.S., Electrical Engineering, December 2011
- Thesis Title: *Multicategory Support Vector Machines in the Primal*
- Adviser: Professor Xiyi Hang

University of California at San Diego, La Jolla, CA
B.A., Applied Mathematics, June 2005

Refereed Journal Publications

[1] Markaki, Y., Gan Chong, J., Wang, Y., Jacobson, E.C., Luong, C., Tan, S.Y.X., Jachowicz, J.W., Strehle, M., Maestrini, D., Banerjee, A.K., Mistry, B.A., Dror, I., Dossin, F., Schöneberg, J., Heard, E., Guttman, M., Chou, T., Plath, K. Xist nucleates local protein gradients to propagate silencing across the X chromosome *Cell.* S0092-8674(21): 01275–01277. 2021 doi:10.1016/j.cell.2021.10.022

[2] Mistry, B.A., Chou, T. Nonspecific Probe Binding and Automatic Gating in Flow Cytometry and Fluorescence Activated Cell Sorting (FACS) *Mathematical Biosciences and Engineering.* 16(5): 4477–4490. 2019. doi:10.3934/mbe.2019223

[3] Mistry, B.A., D'Orsogna, M.R., Chou, T. The Effects of Statistical Multiplicity of Infection on Virus Quantification and Infectivity Assays. *Biophysical Journal.* 114(12):2974–2985. 2018. doi:10.1016/j.bpj.2018.05.005

[4] Mistry, B., D'Orsogna, M.R., Webb, N.E., Lee, B., and Chou, T. Quantifying Sensitivity of HIV-1 Viral Entry to Receptor and Coreceptor Expression through Kinetic Models. *Journal of Physical Chemistry B.* 120(26):6189–6199. 2016. doi:10.1021/acs.jpcb.6b02102

Conference Presentations

[1] *Biophysical Society 64th Annual Meeting*, February 16, 2020. Oral Presentation.

[2] *Claremont Center for the Mathematical Sciences Applied Mathematics Seminar*, January 27, 2020. Oral Presentation.

[3] *CSU Northridge Applied Mathematics Seminar*, October 16, 2019. Oral Presentation.

[4] *Southern California Applied Mathematics Symposium*, April 27, 2019. Oral Presentation.

[5] *American Physical Society March Meeting*, March 4–8, 2019. Oral presentation.

[6] *8th Annual Southern California Systems Biology Conference*, February 9, 2019. Poster presentation.

[7] *4rd Annual Quantitative and Computational Biosciences Retreat*, September 25, 2018. Poster presentation.

[8] *11th Annual International Conference on Systems Biology of Human Diseases*, June 4–6, 2018. Poster presentation.

[9] *American Physical Society March Meeting*, March 5–9, 2018. Poster presentation.

[10] *Biophysical Society 62nd Annual Meeting*, February 17–21, 2018. Poster presentation.

[11] *3rd Annual Quantitative and Computational Biosciences Retreat*, September 26, 2017. Poster presentation.

[12] *7th Annual Southern California Systems Biology Conference*, January 28, 2017. Oral presentation.

[13] *Gordon Research Conference: Stochastic Physics in Biology*, January 8–13, 2017. Poster presentation.

[14] *2nd Annual Quantitative and Computational Biosciences Retreat*, September 20, 2016. Oral presentation.

[15] *10th European Conference on Mathematical and Theoretical Biology and SMB Annual Meeting*, July 11–15, 2016. Poster presentation.

[16] *Southern California Applied Mathematics Symposium 2016*, June 4, 2016. Poster presentation.

[17] *Biology and Medicine through Mathematics Conference*, May 20–22, 2016. Poster presentation.

[18] *Multiscale Modeling and Validation in Medicine and Biology III*, February 25–26, 2016. Poster presentation.

[19] *GATP-BWF-SIB Joint Research Symposium 2015*, April 27, 2015. Poster presentation.

[20] *Sigma Xi Research Symposium: Cal. State Northridge 2013*, April 26, 2013. Oral presentation.

Teaching Experience

Claremont McKenna College, Claremont, CA

Visiting Assistant Professor **August 2019 to Present**

- MATH 30: Calculus 1 Fa2021
- MATH 52: Introduction to Statistics Sp2021
- CSCI 36: Foundations of Data Science Fa2020

Data Science Capstone Faculty Adviser **August 2019 to Present**

- Team Dodgers: Probabilistic Model of First Baseman Performance Fa2021
- Team Dreyev: Persona Classification Sp2021
- Team Wellpath: Predicting Medication Demand Fa2020
- Team Wellpath: Identifying Geospatial Predictors of Suicide Among the California Incarcerated Population Sp2020

QCL Workshop Instructor **August 2019 to Present**

- QCL Workshop: Get Equipped with Latex Fa2021
- QCL Workshop: Get Equipped with Matlab Fa2021
- QCL Workshop: Get Equipped with Latex Sp2021
- QCL Workshop: Get Equipped with Matlab Sp2021
- QCL Workshop: Get Equipped with Latex Fa2020
- QCL Workshop: Get Equipped with Matlab Fa2020
- QCL Workshop: Get Equipped with Latex Sp2020
- QCL Workshop: Get Equipped with Matlab Sp2020
- QCL Workshop: Get Equipped with Matlab Fa2019

University of California at Los Angeles, Los Angeles, CA

Teaching Fellow **September 2017 to June 2019**

- CLUSTER 70C: Infinite Complexity and Chaos Sp2019
- CLUSTER 70B: Cosmos and Life Wi2019
- CLUSTER 70A: Cosmos and Life Fa2018
- CLUSTER 70C: Infinite Complexity and Chaos Sp2018
- CLUSTER 70B: Cosmos and Life Wi2018
- CLUSTER 70A: Cosmos and Life Fa2017

California State University at Northridge, Northridge, CA

Guest Lecturer **September 2016**

- MATH 493: Undergraduate Seminar in Mathematics Fa2016

Teaching Assistant **September 2012 to May 2013**

- MATH 102L: College Algebra Lab Sp2013
- MATH 103L: Mathematics Models for Business Lab Fa2012

Upward Bound STEM Instructor **February 2011 to July 2012**

- Upward Bound Summer Session: Calculus Su2012
- Upward Bound Summer Session: Calculus Su2011
- Upward Bound Summer Session: Imagine Mars Su2011
- Upward Bound Saturday Academy Sp2011

Professional Experience

University of California at Los Angeles, Los Angeles, CA

IPAM RIPS Academic Mentor **June 2018 to August 2018**

- Managed two teams of undergraduate mathematics students enrolled in a summer research internship program at Hong Kong University of Science and Technology. Each team worked with an industry sponsor to solve a real world problem, document their results, and present their findings to an audience of academics.
  - One team, working with Tencent in Shenzhen, China, expanded methods of automated music generation using a hybrid of recurrent and convolutional neural networks.
  - The second team, working with Using.ai in Shenzhen, China, formulated a method of semi-supervised learning using deep convolution generative adversarial networks for computer vision applications in autonomous vehicles.

California State University at Nortrhidge, Northridge, CA

Graduate Researcher **June 2011 to May 2013**

- Developed an algorithm to simulate phase transition in large scale biological swarms induced by thermodynamic noise and spontaneous birth and death of individuals.
- Implemented an OpenGL 3D graphics visualization of the simulation.

Arete Associates, Northridge, CA

Intern Scientist **June 2010 to August 2010**

- Developed two algorithms to map out areas of a digital elevation model that would be obscured from view of a tracker of a given airborne position for applications in tracking methodologies.
  - One algorithm used concepts of ray tracing and geometry to test collisions of a ray connecting the target and tracker with the digital terrain. The resulting obscuration map was exported to Google Earth to overlay with the terrain map.
  - The second algorithm used OpenGL 3D modeling to make use of the depth buffer to generate a shadow map.
- Presented and defended my final results of the project to the entire staff of scientists and engineers of the company.

Edwards Air Force Base, Edwards AFB, CA

Electrical Engineer **June 2008 to May 2010**

- Collaborated with other intern engineers on various projects in the Avionics Lab.
  - Developed the hardware configuration and software for a guidance system for a small scale, inert smart bomb. This included coding a Kalman filter and interfacing with a micro controller and electric servos.
  - Built a prototype of a single-winged unmanned aerial vehicle to test a proof of design.
  - Collaborated with CSU Northridge's ECE faculty to develop a software-defined radio. In charge of developing a demodulation scheme for the raw input signal before being fed into a digital signal processor.
- Taught a course on object oriented programming with C++ and micro controller development to high school interns for two separate summers.

Hardware and Software Skills

Computer Programming:

- C, C++, OpenGL, Matlab, Mathematica, R, TEX (LATEX, BIBTEX), JavaScript, HTML, CSS, Assembly (SPARC, Motorola).

Analog and Digital Electronics:

- Digital signal processors and filters. Microcontrollers (Motorola HCS12, Arduino) and interfacing them with PWM compatible devices (servos, motors, etc.). IPC certified in soldering

Expertise

Mathematics:

- Applied Mathematics, Linear Algebra, Numerical Analysis, Real and Complex Analysis, Measure Theory, Calculus of Variation, Topology, Stochastic Processes, Ordinary and Partial Differential Equations, Mathematical Physics, Group, Ring, and Field Theory, Nonlinear Regression, Combinatorics

Biology:

- Evolutionary Biology, Immunology, Virology, Physics of Biological Assays, Chromosome Folding, Developmental Biology, Neuroscience, Biochemistry, Ecology

Electrical Engineering:

- Linear and Nonlinear Systems Theory, Optimal Control, Digital Control, Fuzzy Control, Digital Signal Processing, Communications, Digital Logic

Computer Science:

- Object Oriented Programming, Pattern Recognition, Machine Learning, 3D Computer Graphics, Nonlinear Numerical Optimization, Assembly Programming

Awards

Claremont McKenna College

- President's Initiative on Anti-Racism Faculty Fellowship, 2021–2022

University of California at Los Angeles

- Carol Newton Travel Award, 2015–2016, 2016–2017, 2017–2018
- Systems and Integrative Biology Training Grant, 2014–2016
- Eugene V. Cota-Robles Fellowship, 2013–2017

The California State University
- CDIP Mini-Grant, 2015–2016
- Chancellor's Doctoral Incentive Program, 2013–2016
- Sally Casanova Pre-Doctoral Scholar, 2012–2013

California State University at Northridge
- Graduate Equity Fellowship, 2012–2013

Security Clearance

U.S. Department of Defense Secret Clearance (expired: 2011)

Citizenship

USA, UK

References Available to Contact

Dr. Jeho Park (e-mail: jeho.park@cmc.edu; phone: (909)-607-8526)
- Director of the Murty Sunak Quantitative and Computing Lab and Visiting Assistant Professor, Mathematical Sciences, Claremont McKenna College
  - ◇ Claremont, CA 91711
  - ⋆ *Dr. Park is my supervisor at Claremont McKenna College.*

Dr. Tom Chou (e-mail: tomchou@ucla.edu; phone: (310)-206-2787)
- Professor, Biomathematics, University of California, Los Angeles
  - ◇ Los Angeles, CA 90095
  - ⋆ *Dr. Chou was my PhD adviser at UCLA.*

Dr. Maria-Rita D'Orsogna (e-mail: dorsogna@csun.edu; phone: (818) 677-2703)
- Professor, Mathematics, California State University at Northridge
  - ◇ 18111 Nordhoff St., Northridge, CA 91330
  - ⋆ *Dr. D'Orsogna was my masters adviser at CSU Northridge and was on my PhD committee at UCLA.*

Dr. Tony Friscia (e-mail: tonyf@ucla.edu; phone: (310)-206-6011)
- Professor, Department of Integrative Biology and Physiology, University of California, Los Angeles
  - ◇ Los Angeles, CA 90095
  - ⋆ *Dr. Friscia is the interim director of the UCLA Cluster program and head of the CLUSTER 70 course. He can speak strongly towards my teaching abilities.*