ASHLEY VALENTINA SCHWARTZ

Curriculum Vitae

San Diego, CA ● ashleyvsch@gmail.com ● 619-772-7191 ● ashleyschwartz.com ● linkedin.com/in/ashleyvsch ● Google Scholar

PROFILE

- **Computational scientist** at the intersection of computational biology, applied mathematics, and machine learning, specializing in -omics data analysis, biological modeling, network biology, and predictive analytics for toxicity and disease research.
- Experienced in developing and applying computational modeling and machine learning approaches to analyze complex biological and chemical data, integrating in silico, in vitro, and in vivo insights to support drug discovery and safety assessment.
- Proven leadership as a computational lead in interdisciplinary teams, skilled in translating computational insights to scientists across disciplines for optimal collaboration to uncover biological mechanisms and identify novel hypotheses.

EDUCATION

Doctor of Philosophy, Computational Science   **08/2020 – 05/2025** (Anticipated)

University of California Irvine, Irvine, California & San Diego State University, San Diego, California

Advisors: Dr. Uduak George, Department of Mathematics & Dr. Karilyn Sant, School of Public Health

Dissertation Title: Computational Models to Assess the Role of Environmental Exposures in Development

Bachelor of Science *Cum Laude*, Applied Mathematics   **08/2015 – 05/2019**

San Diego State University, San Diego, California

SKILLS

Programming Languages: Advanced: Python, R, MATLAB | Other: C, C++, FORTRAN 90, Perl, SQL

Machine Learning Libraries: Pytorch, Keras, Tensorflow, Scikit-Learn, NumPy

Other Tools: Linux/Unix, Git/GitHub, LaTeX, ImageJ, Simpleware

Dynamical Skills: software development, image analysis, numerical analysis, algorithm development, high performance computing (HPC), bioinformatics, statistical and mathematical modeling

INDUSTRY EXPERIENCE

Quantitative Systems Pharmacology Intern   **06/2022– 08/2022**

Quantitative Translational Sciences, Takeda Pharmaceuticals (San Diego, California)

- Developed a quantitative systems pharmacology (QSP) model in MATLAB to simulate the neuropathology of Parkinson's Disease by integrating internal experimental data and publicly available human disease datasets.
- Determined the optimal time for therapeutic intervention to support the neuroscience interdisciplinary program at Takeda.
- Applied advanced quantitative techniques, including pharmacokinetics and pharmacodynamics (PK/PD) modeling, to bridge preclinical data with clinical outcomes, contributing to translational research strategies.

RESEARCH EXPERIENCE

Doctoral Candidate   **08/2023 – present**

Computational Science Research Center, San Diego State University (San Diego, California)

- Applied advanced mathematical and computational modeling techniques, network analysis, and AI/machine learning, to investigate toxicant effects on embryonic development using multi-modal datasets, such including molecular, transcriptomic (RNA-seq), epidemiological, and environmental data from both model organisms and humans.

- Developed an open-source bioinformatics Python package and associated documentation website, DanRerLib, to support researchers studying the perturbed biological functions and pathways in zebrafish following an experimental condition.
- Developed an integrative multilayer network model and machine learning approach to identify and utilize multifactorial relationships, enhancing predictive power for pinpointing birth defect outcomes and associated molecular events.
- Led and contributed to cross-disciplinary research projects spanning toxicology, immunology, and cancer metabolism, applying advanced computational modeling and bioinformatics to diverse biological systems, including spatial and single-cell transcriptomics, proteomics, metabolomics, and image-based analysis.

Doctoral Student   **08/2020 – 08/2023**

University of California Irvine and San Diego State University (Irvine and San Diego, California)

- Developed an ordinary differential equation-based mathematical model to describe zebrafish growth and nutrient absorption, supporting environmental perturbation analysis.
- Designed a dynamic network analysis approach to investigate structural malformations in zebrafish caused by environmental chemicals to identify early toxicity signals in zebrafish development and their connection to progressive toxicity effects.

Graduate Research Assistant   **05/2019 – 08/2020**

Department of Mathematics and Statistics and School of Public Health, San Diego State University (San Diego, California)

- Collaborated in designing wet lab experiments to optimize the mathematical modeling and data analysis efforts.
- Successfully led a team in executing a complex toxicology microscopy experiment, overseeing all aspects from chemical handling and exposures to fish staging and imaging, ensuring precise and reliable results.

Undergraduate Research Assistant   **01/2018 – 05/2019**

Department of Mathematics and Statistics, San Diego State University (San Diego, California)

- Developed an image processing algorithm capable of accurately identifying the pancreas size in zebrafish to determine altered pancreas development following environmental exposures.
- Applied advanced statistical and mathematical techniques to investigate the dynamics of Human Immunodeficiency Virus (HIV) in individuals under the influence of drugs of abuse as a member of the Disease Modeling Lab at SDSU.

TEACHING EXPERIENCE

Python Programming with Libraries Graduate Teaching Assistant   **09/2021 – 03/2022**

Donald Bren School of Information and Computer Sciences, University of California Irvine (Irvine, California)

- Provided interactive tutoring sessions to students, guiding them in mastering essential Python programming skills.
- Successfully managed administrative tasks, including grading, and providing support to a diverse group of over 100 students.

Calculus For Life Sciences Graduate Teaching Assistant   **08/2020 – 05/2021**

Department of Mathematics and Statistics, San Diego State University (San Diego, California)

- Conducted engaging bi-weekly activity sessions to reinforce student understanding of calculus through real-world applications.
- Developed comprehensive lesson plans and gathered student feedback to enhance course materials and student success.

Precalculus Teaching Assistant Lead   **08/2017 – 05/2019**

Department of Mathematics and Statistics, San Diego State University (San Diego, California)

- Facilitated interactive precalculus activity sessions, focusing on active learning and applications of mathematical concepts.
- Demonstrated strong leadership skills by developing and organizing lesson plans for a team of teaching assistants.

AWARDS AND ACCOMPLISHMENTS

FELLOWSHIPS AND SCHOLARSHIPS

2024-present   **University Graduate Fellow,** San Diego State University College of Graduate Studies

2022-present	**ARCS Scholar**, Achievement Rewards for College Scientists, San Diego Chapter
2020-present	**NSF S-STEM ASSICS Scholar**, National Science Foundation Funded Academic Support & Scholarships for Interdisciplinary Computational Scientists
2020-2022	**ACM SIGHPC Computational and Data Science Fellow**, Association for Computing and Machinery Special Interest Group on High-Performance Computing
2018	**Howell-CSUPERB Research Scholar**, Doris A. Howell Foundation – California State University Program for Education & Research in Biotechnology

SCHOLARLY AWARDS

10/2024	Poster Presentation Competition Award, 3rd Place, Southern California Regional Chapter of the Society of Toxicology Annual Meeting
03/2024	Windover Ventures Award, Computational Science Research Center (CSRC) Applied Computational Science and Engineering Student Showcase
03/2024	Raymond Moberly Service Award, CSRC Applied Computational Science and Engineering Student Showcase
05/2023	Diversity Initiatives Career Development Award, Society of Toxicology
04/2023	Director's Award (1st Place), CSRC Applied Computational Science and Engineering Student Showcase
03/2023	Finalist - Best Trainee Abstract Award, Biological Modeling Specialty Section, Society of Toxicology Annual Meeting 2023
04/2021	1st Place - Physical and Mathematical Sciences; Interdisciplinary, California State University Student Research Competition, SDSU delegate
03/2021	Director's Award (1st Place), CSRC Applied Computational Science and Engineering Student Showcase
03/2021	President's Award, San Diego State University Student Research Symposium
03/2019	Undergraduate Research Excellence Award, San Diego State University Student Research Symposium

TRAVEL AWARDS

12/2024	Graduate Student Travel Support Award, Society of Toxicology
12/2024	Graduate Student Travel Fund, San Diego State University College of Graduate Studies
11/2023	Graduate Student Travel Award, Predictive Modeling in Biology and Biomedicine Conference
10/2023	Advanced Research Course Tuition and Travel Award, Marine Biological Laboratory Advanced Research Course on Gene Regulatory Networks for Development

RESEARCH

SELECTED PUBLICATIONS

1. Schwartz A.V., George U.Z., Beaulieu A., Sant K.E. **Associations between birth defect incidence and maternal, sociodemographic, and environmental factors in California from 2018-2019: A computational approach**. *[manuscript in preparation]*

2. Schwartz A.V., Sant K.E., George U.Z. **Integrating Network Analysis and Machine Learning to Elucidate Chemical-Induced Pancreatic Toxicity in Zebrafish Embryos**. *[manuscript under review]*

3. Goebel J., **Schwartz A.V.**, Fletcher A.T., Holden P.A., Hoh E., Sant K.E. **Comparative toxicity of the fungicide Boscalid and its metabolite M510F01 in zebrafish embryos**. *[manuscript under revsion]*

4. Schwartz A.V., Sant K.E., George U.Z. **danRerLib: a python package for zebrafish transcriptomics**. *Bioinformatics Advances.* Published online May 6, 2024. DOI: 10.1093/bioadv/vbae065.

5. Adam Ahmed Adam M.*, Robinson M.*, **Schwartz A.V.***, Wells G.*, Hoang A., Albekioni E., Chao G., Weeks J., George U.Z., House C.D., Turcan Ş., Sohl C.D. **Catalytically distinct IDH1 mutants tune phenotype severity in tumor models**.

bioRxiv [preprint]. Published online April 23, 2024. DOI: 10.1101/2024.04.22.590655. ***These authors contributed equally to this manuscript.**

6. **Schwartz A.V.**, Sant K.E., George U.Z. Development of a Dynamic Network Model to Identify Temporal Patterns of Structural Malformations in Zebrafish Embryos Exposed to a Model Toxicant, Tris(4-chlorophenyl)methanol. *Journal of Xenobiotics*. Published online June 16, 2023. DOI: 10.3390/jox13020021.

7. **Schwartz A.V.***, Lee A.N.*, Theilmann R.J., George U.Z. Spatial heterogeneity of excess lung fluid in cystic fibrosis: generalized, localized diffuse, and localized presentations. *Applied Sciences.* Published online October 21, 2022. DOI: 10.3390/app122010647. ***These authors contributed equally to this manuscript.**

8. **Schwartz A.V.**, Sant K.E., Navarrete J., George U.Z. Mathematical modeling of the interaction between yolk utilization and fish growth in zebrafish, Danio rerio. *Development*. Published online May 7, 2021. DOI: 10.1242/dev.193508.

9. Navarrete J., Wilson P., Allsing N, Gordon C., Margolis R, **Schwartz A.V.**, Rogowski B., Topps J., George U.Z., Sant K.E. The ecotoxicological contaminant Tris(4-chlorophenyl)methanol (TCPMOH) impacts embryonic development in zebrafish (Danio rerio). *Aquatic Toxicology*. Published online March 26, 2021. DOI: 10.1016/j.aquatox.2021.105815.

10. Horkowitz, A.P., **Schwartz A.V.**, Alvarez, C.A., Herrera, E.B., Thoman, M.L., Chat-field, D.A., Osborn, K.G., Feuer, R., George U.Z., Phillips, J.A. Acetylcholine Regulates Pulmonary Pathology During Viral Infection and Recovery. *Immunotargets and Therapy*. Published online December 17, 2020. DOI: 10.2147/ITT.S279228.

SELECTED PRESENTATIONS

1. **Selected Featured Speaker, Award Recipient.** Integrating Network Analysis and Machine Learning to Elucidate Chemical-Induced Pancreas Toxicity in Zebrafish Embryos. Oral and poster presentation at the Southern California Regional Chapter of the Society of Toxicology. Irvine, CA. 2024 Oct 3.

2. **Award Recipient.** danRerLib: A Python Package for Zebrafish Transcriptomics. Oral and poster presentation at the Computational Science Research Center Applied Computational Science and Engineering Student Showcase. San Diego, CA. 2024 Mar 22.

3. Machine learning identifies the chemical properties that predict pancreas toxicity in the zebrafish model. Poster presentation at the Predictive Modeling in Biology and Biomedicine Conference. Riverside, CA. 2024 Nov 17-19.

4. **Award Recipient.** Mathematical modeling of the interaction between yolk utilization and fish growth in zebrafish following developmental exposure to Tris(4-chlorophenyl)methanol (TCPMOH). Poster presentation at the Society of Toxicology Annual Meeting, Biological Modeling Poster Session. Nashville, TN. 2023 March 19-23.

5. **Selected Featured Speaker.** Machine learning and high-performance computing for the aggregation of publicly available data sets. Platform session oral presentation at the Southern California Chapter of the Society of Toxicology; Emerging Topics in Systems Toxicology. San Diego, CA. 2022 October 6.

6. **Invited Speaker**. New metrics for quantifying the spatial inhomogeneity of abnormal lung fluid in MR images of cystic fibrosis lungs. Invited oral presentation at the Society of Mathematical Biology Annual Meeting, Minisymposia on understanding lung function and disease through mathematical modeling and experiment. Virtual. 2021 June 13-17.

7. **Invited Speaker, Award Recipient.** Network models for analyzing the deformities induced by the ecotoxicological contaminant Tris(4-chlorophenyl)methanol (TCPMOH) in developing zebrafish (Danio rerio). Oral presentation at the California State University Student Research Competition. Virtual. 2021 April 30 – May 1.

8. **Award Recipient**. Developmental deformities induced by the ecotoxicological contaminant Tris(4-chlorophenyl)methanol (TCPMOH) in zebrafish (Danio rerio). Oral presentation at the Computational Science Research Center Applied Computational Science and Engineering Student Showcase. Virtual. 2021.

9. An automated algorithm for the spatial identification of abnormal lung fluid in cystic fibrosis patients. Oral presentation at the Viral Information Institute Annual Meeting. Virtual. 2021 January 15.

10. **Selected Featured Speaker.** Analyzing the effect of perfluorobutane sulfonic acid on pancreatic organogenesis in zebrafish using automated image segmentation. Platform session oral presentation at the Southern California Chapter

of the Society of Toxicology; Emerging Topics in Computational, Drug Discovery, Neuro-, and Environmental Toxicology. San Diego, CA. 2019 November 7.

11. **Award Recipient.** Mathematical and computational models analyzing the effects of common pollutants in the zebrafish model. San Diego State University Student Research Symposium. San Diego, CA. 2019 March 1-2.

12. Mathematical models to predict the risk of HIV infection under drugs of abuse. San Diego State University Student Research Symposium. San Diego, CA. 2018 March 2-3.

SERVICE AND LEADERSHIP

2023-	**President,** San Diego State University Society for Industrial and Applied Mathematics Student Chapter
2023-	**Open-Source Scientific Communication Blogger,** ashleyschwartz.com
2023-2025	**Mentor,** Society of Toxicology Committee for Diversity Initiatives Undergraduate Education Program
2023-2024	**Graduate Student Representative,** San Diego State University College of Sciences Student Council
2023	**Graduate Student Sub-Committee, Faculty Search Committee,** Computational Science Faculty
2020-2021	**Mentor,** SDSU Women in Science Society
2018-2020	**Calculus Ambassador,** Underrepresented Minorities in STEM Retention Rate Project
2017-2019	**Volunteer Tutor,** Grossmont High School Department of Mathematics
2015-2018	**Volunteer Reading Tutor,** Read-Lead-Achieve Champions are Readers Philanthropy

PROFESSIONAL AFFILIATIONS

2024-	American Society for Cellular and Computational Toxicology – Student Member
2022-	Society of Toxicology – Graduate Student Member
2022-	Society for Industrial and Applied Mathematics – Student Member