ASHLEY VALENTINA SCHWARTZ

Curriculum Vitae

Southern California ● https://ashleyschwartz.com ● https://linkedin.com/in/ashleyvsch

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PROFILE

Computational science PhD student at San Diego State University and the University of California Irvine. Strong organization and time-management skills gained through research, teaching, and mentoring while maintaining a high GPA. Dedicated to developing and utilizing mathematical and computational models in an interdisciplinary setting. Continually bridging the gap between applied mathematics, computer science, and biology with a specialization in developmental toxicology.

EDUCATION

Doctor of Philosophy, Computational Science **08/2020 – present**
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

Graduate Coursework, Applied Mathematics **08/2019 – 05/2020**
San Diego State University, San Diego, California

Bachelor of Science *Cum Laude*, Applied Mathematics **08/2015 – 05/2019**
San Diego State University, San Diego, California

INDUSTRY APPOINTMENTS

Quantitative Systems Pharmacology Intern **06/2022– 08/2022**
Takeda Pharmaceuticals, Quantitative Translational Sciences (San Diego, California)

- Developed a quantitative systems pharmacology model to simulate the neuropathology of Parkinson's Disease.
- Determined the optimal time for therapeutic intervention to support the neuroscience interdisciplinary program at Takeda.
- Utilized quantitative techniques such as pharmacokinetics and pharmacodynamics (PK/PD) modeling to translate preclinical data and predictions to the clinic.

RESEARCH APPOINTMENTS

Graduate Research Assistant **08/2019 – present**
San Diego State University George Lab & Sant Lab (San Diego, California)

- Developed mathematical and computational models to describe toxicant-induced perturbations to embryonic development.
- Accelerated data processing through developed image processing algorithms in MATLAB for cystic fibrosis disease classification.
- Communicated research results through authored publications and presentations in various conferences and journals.
- Acquired funding for research support from the Association of Computing and Machinery.

San Diego State University Sant Lab (San Diego, California)

- Assisted design of wet lab experiments for optimized data analysis and mathematical model development.
- Led a team through a toxicology microscopy experiment including chemical handling, chemical dosing, fish staging, and imaging.

Graduate Research Fellow **09/2021 – 06/2022**

University of California Irvine Institute for Genomics and Bioinformatics (Irvine, California)

- Acquired knowledge and practice surrounding computational techniques for computational biology and bioinformatics including but not limited to machine learning approaches such as Markov-chain, Monte-Carlo methods, and clustering.

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

San Diego State University George Lab and Disease Modeling Lab (San Diego, California)

- Developed an image processing algorithm to identify the zebrafish pancreas area.
- Pioneered toxicology microscopy experiments in the wet lab.
- Acquired funding and support from the California State University Biotechnology program through an individual scholar grant.
- Programmed algorithms for numerical integration and data visualization.

TEACHING APPOINTMENTS

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

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

- Tutored students in essential Python programming skills in an interactive computer laboratory setting.
- Regulated and completed administrative back-end tasks such as grading and student support for over 100 students.

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

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

- Taught bi-weekly activity sessions to solidify student knowledge through repetition and real-world applications.
- Developed lesson plans and surveyed student engagement and success to continually improve on course material.
- Regulated and completed administrative back-end tasks such as grading and student support.

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

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

- Taught precalculus activity sessions focused on active learning and applications of mathematics.
- Developed and prepared lesson plans for the teaching assistant team.
- Organized team dynamics and task delegation.

ACHIEVEMENTS

FELLOWSHIPS

$10,000/year – ARCS Scholar **2022-present**

Achievement Rewards for College Scientists, San Diego Chapter

$30,000 - ACM SIGHPC Computational and Data Science Fellow **2020-2022**

Association for Computing and Machinery Special Interest Group on High-Performance Computing

$20,000 - NSF ASSICS Scholar **2020-2022**

National Science Foundation Funded Academic Support & Scholarships for Interdisciplinary Computational Scientists

$3,500 - Howell-CSUPERB Research Scholar **12/2018**

Doris A. Howell Foundation – California State University Program for Education & Research in Biotechnology

AWARDS AND HONORS

Diversity Initiatives Career Development Award **05/2023**
Society of Toxicology

Director's Award (1st Place) **04/2023**
Computational Science Research Center Applied Computational Science and Engineering Student Showcase

Finalist - Best Trainee Abstract Award **03/2023**
Biological Modeling Specialty Section, Society of Toxicology 2023

1st Place - Physical and Mathematical Sciences; Interdisciplinary **04/2021**
California State University Student Research Competition, SDSU delegate

Director's Award (1st Place) **03/2021**
Computational Science Research Center Applied Computational Science and Engineering Student Showcase

President's Award **03/2021**
San Diego State University Student Research Symposium

Undergraduate Research Excellence Award **03/2019**
San Diego State University Student Research Symposium

RESEARCH

PUBLICATIONS

1. 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. https://doi.org/10.3390/app122010647. * These authors contributed equally to this manuscript.
2. 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. https://doi.org/10.1242/dev.193508.
3. 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. https://doi.org/10.1016/j.aquatox.2021.105815.
4. Lee A.N., Schwartz A.V., Theilmann R.J., George U.Z. Characterization of mucus in digital image analysis of cystic fibrosis lungs. *Proceedings of the Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3C)*. Vail, CO, June 17-20.
5. 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. https://doi.org/10.2147/ITT.S279228.
6. Bowers J.S., Poole B.D., Maher-Boulis C., Schwartz A.V., Bloomquist A., Young E.S. The Roles and Benefits of Using Undergraduate Teaching Assistants to Support the Work of SUMMIT-P. *Journal of Mathematics and Science: Collaborative Explorations*. Published online August 11, 2020. https://doi.org/10.25891/zdjg-m390.

PRESENTATIONS

1. **Award Recipient.** Machine learning identifies the chemical properties that predict pancreas toxicity in the zebrafish model. Oral and poster presentation at the Computational Science Research Center Applied Computational Science and Engineering Student Showcase. San Diego, CA. 2023 Apr 7.
2. **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.

3. **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.
4. A developed complex network model for zebrafish embryonic deformity incidence following developmental exposure to Tris(4-chlorophenyl methanol (TCPMOH). Poster presentation at the Society of Toxicology Annual Meeting, Computational Toxicology Poster Session. San Diego. 2022 March 27-31.
5. Mathematical and network models reveal significant developmental deformities induced by the ecotoxicological contaminant Tris(4-chlorophenyl)methanol (TCPMOH) in zebrafish (Danio rerio). Oral presentation at the Society for Industrial and Applied Mathematicians Annual Meeting. Virtual. 2021 July 11-15.
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. Mathematical and network models reveal significant developmental deformities induced by the ecotoxicological contaminant Tris(4-chlorophenyl)methanol (TCPMOH) in zebrafish (Danio rerio). Oral presentation at the American Mathematical Society Fall Western Sectional Meeting. Virtual. 2021 October 23-24.
8. **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.
9. **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.
10. **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 San Diego State University Student Research Symposium. Virtual. 2021 March 26.
11. 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.
12. A mathematical model describing the interaction between embryonic nutrition and overall growth. Oral presentation at the San Diego State University Student Research Symposium. San Diego, CA. 2020 February 28-29.
13. Tris(4-chlorophenyl)methanol contributes to embryonic nutrition perturbation, a mathematical model. Oral presentation at the American Mathematical Society Fall Western Sectional Meeting. Riverside, CA. 2019 Nov 9-10.
14. **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.
15. **Invited.** Mathematical and computational models analyzing the effects of common pollutants in the zebrafish model. Poster presentation at the San Diego State University Student Research Symposium Showcase; Inauguration of SDSU President Dr. Adella De La Torre. San Diego, CA. 2019 April 11.
16. **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.
17. 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.

UNDERGRADUATE RESEARCH PROJECTS ADVISED

1. Anh Nuygen, Computer Science, SDSU. Project: Spatial transcriptomics for the understanding of immune function in vaping-associated pulmonary injury.
2. Mariel Reyes, Computer Science, SDSU. Project: Computer-aided disease classification of Cystic Fibrosis.
3. Jasmine Camacho and Aqueycha Chavira Guajardo, Mathematics, SDSU. Project: Analyzing the interaction between FGF10 and SHH proteins in early lung development through mathematical and computational models.

4. Amanda Lee, Mathematics, SDSU. Project: Computer-aided disease classification of Cystic Fibrosis.

SERVICE

2023- **President, San Diego State University Society for Industrial and Applied Mathematicians Chapter**
Elected president for the SDSU SIAM chapter. Duties include organizing chapter events, serving on the SDSU College of Sciences Student Council, communicating with the national chapter, and creating a community on campus for computational science students.

2023 **Graduate Student Sub-Committee, Faculty Search Committee, Computational Science Faculty**
Volunteered for the faculty search committee including attending candidate talks, participating in candidate lunches to discuss student perspectives, and participating in discussions to submit final recommendations to the faculty search committee.

2023 **Mentor, Society of Toxicology Committee for Diversity Initiatives Undergraduate Education Program**
Participated as a mentor in the Undergraduate Education Program and the session titled "Graduate School: How to get in and what to expect? Graduate student and academic Advisor perspectives.

2020-2021 **Mentor, SDSU Women in Science Society**
Mentored women in STEM through their undergraduate careers by providing advice on ways to get involved and stay successful on campus.

2018-2020 **Calculus Ambassador, Underrepresented Minorities in STEM Retention Rate Project**
Presented real-world applications of calculus to Calculus 1 students at SDSU aiming to inspire students about their impact as STEM majors.

2018-2019 **Vice President and Co-Founder, STEM Education Club**
Established club presence on the San Diego State University campus through administrative tasks, marketing, meeting facilitation, panel, and guest speaker organization.

2017-2019 **Volunteer Tutor, Grossmont High School Department of Mathematics**
Assisted high school mathematics teachers in attending to student questions during class time.

2015-2018 **Volunteer Reading Tutor, Read-Lead-Achieve Champions are Readers Philanthropy.**
Participated in and organized fundraising events to purchase books for inner-city San Diego elementary schools. Visited the schools to deliver books, provide reading supplies, and facilitate reading groups.

PROFESSIONAL AFFILIATIONS

2022- **Society of Toxicology – Graduate Student Member**
Computational Toxicology Specialty Section, Biological Modeling Specialty Section, Mechanisms and Systems Biology Specialty Section, Hispanic Organization of Toxicologists

2022- **Society for Industrial and Applied Mathematicians – Member**

2020-2022 **Association for Computing and Machinery – Member**
Special Interest Group on High-Performance Computing

RELEVANT COURSEWORK

2022 Machine Learning (A), Statistical Methods Categorical Data Sets (A), Merging Models and Data (A-)

2021 Introduction to Artificial Intelligence (A), Statistical Methods for Data Analysis (A), Principles of Scientific Computing (A), Parallel Computing (A), Computational Database Fundamentals (A), Research Ethics Seminar (CR)

2020 Computational Methods for Scientists (A), Advanced Computational Methods for Optimization (A), Mathematical Modeling with Applications in Biology (A), Numerical Partial Differential Equations (A), Advanced Biostatistical Methods 2 (A)

2019 Mathematical Physiology (A), Advanced Biostatistical Methods 1 (B+), Continuous Dynamical Systems and Chaos (A), Numerical Matrix Analysis (A), Partial Differential Equations (A)

2018 Functions of a Complex Variable (A), Abstract Algebra (A), Inro to Numerical Analysis and Computing (A), Mathematical Biology and Biomedicine (A)

2017 Applied Probability (A), Advanced Linear Algebra (A), Elementary Differential Equations (A)

SKILLS

Programming Languages: *Advanced*: MATLAB, Python, *Other*: C, C++, R, FORTRAN 90, Perl, SQL
Machine Learning Libraries: Pytorch, Keras, Tensorflow, Scikit-Learn, NumPy
Other Tools: LaTeX, ImageJ, Simpleware, Microsoft, macOS, Linux
Scientific Computing: image analysis, optimization, numerical analysis, database design, algorithm development, cluster computing, machine learning
Soft Skills: team player, problem solver, creative thinking, project development

REFERENCES

UDUAK GEORGE
Assistant Professor
Department of Mathematics and Statistics
San Diego State University
e. ugeorge@sdsu.edu
Note: Dr. George is my primary research advisor (2018-present) and can speak on my mathematical and computational abilities.

KARILYN SANT
Assistant Professor
Division of Environmental Health, School of Public Health
San Diego State University
e: ksant@sdsu.edu
Note: Dr. Sant is my secondary research mentor (2018-present) and can speak on my applied knowledge in the toxicology field.

ANTONI LUQUE
Assistant Professor
Department of Mathematics and Statistics
San Diego State University
e. aluque@sdsu.edu
Note: Dr. Luque is the lead professor for the Calculus for Life Sciences and can speak to my teaching abilities (2020-2021).