Nasreen Buhn

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EDUCATION

California Polytechnic State University, San Luis Obispo, CA
Bachelor of Science in Biological Sciences, Concentration in Cellular and Molecular Biology, Minors in Computer Science and Bioinformatics, *Cum Laude* June 2025

Relevant Coursework: Bioinformatics Algorithms, Deep Learning, Bioinformatics Capstone I & II, Intro to Data Science, Data Structures, Applied Experimental Design and Regression Models, Project-Based Object-Oriented Programming and Design, Biochemical Principles, Cell Biology

Honors: President's Honors List (2023-2024), Dean's List (6 quarters, 2022-2025)

RESEARCH EXPERIENCE

Perelman School of Medicine at the University of Pennsylvania
Bioinformatics Researcher, Starting December 2025
Advisor: Dr. Saar Gill
Building a high throughput RNA seq survival analysis platform integrating RNA seq data with survival curve modeling; conducting scRNA seq analysis in Seurat.

Pheast Therapeutics, California Polytechnic State University
Bioinformatics Consultant (Contract), August 2025-Present
Advisor: Jean Davidson
Applied unsupervised clustering to macrophage and cancer co-culture time-series datasets to compare treatment response profiles across SMIs, cell lines, and doses in combination with a new drug. Analyzed donor-specific effects and onset of phagocytosis.

California Polytechnic State University, Computer Science & Software Engineering Department
Summer Undergraduate Research Program, *College of Engineering*, June 2024-September 2024
Undergraduate Research Assistant, September 2024-Present
Advisor: Jonathan Ventura
Trained, tested, and evaluated supervised deep learning models for fluorescence microscopy image denoising as part of NIH-funded research. Developed a stitching algorithm to reconstruct full-resolution images from overlapping, denoised segments with varying light intensities. Assessed denoising performance using PSNR and SSIM image quality metrics.

QuantumCyte, California Polytechnic State University, Bioinformatics Capstone
Undergraduate Bioinformatics Consultant (Internship), April 2025-June 2025
Advisors: Jean Davidson, Paul Anderson
Co-developed a modular, interactive RNA-seq analysis pipeline in R. Built core modules for data cleaning, differential gene expression analysis, PCA, GSEA, and GO analysis, enabling real-time adjustment of parameters such as p-value thresholds, sample groupings, and sample-size assumptions. Identified 36 candidate biomarker genes for pre-metastatic tumor buds from triplet RNA-seq data comparing tumor buds, carcinoma, and stroma across multiple patients.

Bioinformatics Research Group, California Polytechnic State University, Biological Sciences and Computer Science & Software Engineering Departments

Undergraduate Research Assistant, January 2024-June 2025

Advisors: Jean Davidson, Paul Anderson
Collaborated on the design and development of a zero-shot entity resolution methodology assessing the impact of context in NIH-funded chronic lower back pain (CLBP) knowledge graph research. Evaluated entity pairs to build a ground-truth dataset and helped craft LLM prompts for entity resolution across varying context levels.

Advisors: Paul Anderson, Javin Oza
Assessed the performance of protein clustering and alignment algorithms for classifying carbonic anhydrase proteins. Applied SVD and k-means clustering, evaluating the impact of sequence length and clustering conditions using silhouette scores. Compared multiple-sequence alignment and multiple-structure alignment methods with phylogenetic tree analysis.

RELATED PROFESSIONAL EXPERIENCE

Jazz Pharmaceuticals
Regulatory Strategy Intern, June 2023-August 2023
Conducted a comprehensive review of real-world evidence (RWE) use in FDA NDAs, BLAs, and supplemental submissions, examining purposes of use, primary endpoints, and cases where submissions were unsuccessful due to RWE control arm limitations.

PUBLICATIONS

Lin, D., Koenig, C., Kaplan, S., Bittner, M., Paraiso, M., **Buhn, N**., et al. (2025). Investigating the impact of context on zero-shot entity resolution: Applications in chronic lower back pain. In *2025 8th International Conference on Information and Computer Technologies (ICICT)* (pp. 390–396). IEEE. https://doi.org/10.1109/ICICT64582.2025.00067

Anderson, P., Lin, D., Davidson, J., Migler, T., Ho, I., Koenig, C., Bittner, M., Kaplan, S., Paraiso, M., **Buhn, N**., et al. (2024). Bridging domains in chronic lower back pain: Large language models and ontology-driven strategies for knowledge graph construction. In I. Rojas, F. Ortuño, F. Rojas, L. J. Herrera, & O. Valenzuela (Eds.), *Bioinformatics and biomedical engineering. IWBBIO 2024. Lecture Notes in Computer Science* (Vol. 14849). Springer, Cham. https://doi.org/10.1007/978-3-031-64636-2_2

SUBMITTED

Buhn, N., Adunur, S., Hamilton, J., Levis, S., Hagen, G., & Ventura, J. (2025). *Comparison of deep learning approaches for extreme low-SNR image restoration*. Submitted for publication.

MANUSCRIPT IN PREPARATION

Standard-of-care chemotherapies combine with CD24 blockade to enhance cancer cell elimination by macrophages. Manuscript in preparation with Pheast Therapeutics.

CONFERENCE PRESENTATIONS

ORAL PRESENTATIONS

Bittner, M., **Buhn, N.,** et al. (2025, May 15-16). *Bioinformatics capstone 2025: Solving real world genomics problems with biotechnology collaborators: Developing a comparative transcriptomics pipeline to identify key biomarkers for pre-metastatic tumor buds* [Conference Session]. Bailey College Student Research Conference 2025, California Polytechnic State University, San Luis Obispo, CA, USA.

POSTER PRESENTATIONS

Butler, J., **Buhn, N.**, et al. (2025, November 15). *Training the next generation in molecular pathology through industry-academic collaboration: precision tissue enrichment of colorectal tumor buds analyzed by undergraduate bioinformatics students* [Poster Presentation, accepted]. Association for Molecular Pathology (AMP) 2025 Annual Meeting and Expo, Boston, MA, USA.

Adunur, S., **Buhn, N.**, Hagen, G., & Ventura, J. (2024, October 18). *Deep learning for microscope image denoising* [Poster Presentation]. Summer Undergraduate Research Program Symposium 2024, California Polytechnic State University, San Luis Obispo, CA, USA. https://digitalcommons.calpoly.edu/ceng_surp/83/

Koenig, C., Bittner, M., Kaplan, S., Paraiso, M., **Buhn, N.**, et al. (2024, May 16-17). *Novel approaches to literature analysis and entity resolution for chronic lower back pain; Knowledge graphs and large language models* [Poster Presentation]. Bailey College Student Research Conference 2024, California Polytechnic State University, San Luis Obispo, CA, USA.

Buhn, N. (2023, October 23-25). *Real world evidence in FDA drug approvals 2021-2023* [Poster Presentation]. The Organization for Professionals in Regulatory Affairs' (TOPRA) Symposium 2023*,* Lisbon, Portugal.

RELEVANT PROJECTS

VIDA: Visual Intelligence for Detecting Anemia, California Polytechnic State University, Deep Learning (CSC 487)
Co-developed an ensemble model approach for anemia detection from peripheral blood smear images and CBC data. Fine-tuned VGG-16 architecture on images, achieving an accuracy of 80.18%, which increased to 85.02% with the addition of CBC data. Assessed model performance using Grad-CAM, identifying prediction drivers and visual cues that influenced model decisions.

Predicting Cancer Incidence Rates from Toxic Chemical Spills, California Polytechnic State University, Introduction to Data Science (DATA 301)
Built a machine learning pipeline to predict county-level cancer incidence rates from chemical spills reported in the EPA Toxics Release Inventory. Used PubChem PUG-REST to extract carcinogen classifications for each release. Conducted data cleaning and feature engineering. Trained regression models (Random Forest, k-NN, SVR) to evaluate predictive relationships.

SKILLS

Programming: Python, R, Java, HTML, CSS
Libraries and Packages: PyTorch, scikit-learn, pandas, NumPy, Matplotlib, Altair, ipywidgets, ggplot2, tidyverse, Bioconductor, DESeq2
Tools and Platforms: Linux, Conda, tmux, Jupyter, Google Colab, VS Code, Vim, Git
Bioinformatics & Imaging: ImageJ, AlphaFold, BLAST, Clustal Omega
Wet-lab Techniques: PCR/RT-PCR, DNA/RNA extraction and purification, gel electrophoresis, aseptic technique, microbial staining and plating

SERVICE

Alzheimer's Association
Walk to End Alzheimer's Volunteer, 2021-2024
Assisted with team fundraising events, contributing to over $60,000 raised annually (2022–2024), and supported annual Walk to End Alzheimer's operations.