JAMES GALANTE

EDUCATION

Stanford University — Stanford, CA
Ph.D. in Genetics — September 2025 – Present

University of Notre Dame — Notre Dame, IN
B.S. in Science-Computing — Magna Cum Laude | GPA: 3.98/4.0

RESEARCH EXPERIENCE

Life Science Research Professional
Stanford University, Genetics Department — **Stanford, CA**
Mentors: Dr. Jesse Engreitz and Dr. Lars Steinmetz — **August 2023 – May 2025**

- Evaluate machine learning models for enhancer mapping, with a focus on optimizing high-throughput sequencing technologies to measure regulatory effects.
- Collect and process publicly available high-throughput CRISPRi screens targeting enhancers, assembling large dataset of non-coding perturbations.
- Develop a user-friendly pipeline to determine the statistical power of different sequencing technologies in detecting small effect sizes, assessing cost-effectiveness of high-throughput methods like TAP-Seq, DC TAP-Seq, Split-TAP-Seq, Perturb-seq, etc.
- Analyze many single cell perturbation datasets contributing to the ENCODE and IGVF consortia efforts in mapping enhancer-gene interactions, presenting research findings at lab meetings and consortium meetings, and actively contributing to standardizing high-throughput CRISPR screen data.
- Collaborate with labs and researchers at MIT, EMBL, and Stanford to address limitations of CRISPR experiments related to power and sequencing techniques, helping experimental biologists design experiments with a statistical framework.

Undergraduate Student Researcher
University of Notre Dame, Department of Biological Sciences — **Notre Dame, IN**
Mentor: Dr. Christopher Patzke — **July 2022 – August 2023**

- Researched the genetic mechanisms of rare neurodevelopmental disorders such as Down Syndrome, Miller-Dieker Syndrome, and Kabuki Syndrome, through super-resolution imaging, NGS, and patient-derived neurons.
- Analyzed the first RNA-Seq data from patient-derived neurons for Miller-Dieker Syndrome.
- Reduced the time of neuronal morphology analysis from weeks to minutes using automated image analyses and C.
- Initiated my own analyses and processed external datasets, including scRNA-Seq, temporal scATAC-Seq, and ChIP-Seq, to validate wet-lab experiments, teaching myself bioinformatics along the way.
- Began to understand how neural networks might be used to answer questions about gene regulation.
- Gained experience in stem-cell culture and neuronal differentiation, PCR, Western Blotting, and Microscopy, providing an invaluable perspective for computational analysis.

Undergraduate Student Researcher
University of Notre Dame, Department of Applied & Comp. Mathematics and Statistics — **Notre Dame, IN**
Mentor: Dr. Robert Rosenbaum — **August 2021 – May 2023**

- Analyzed unsupervised and supervised convolutional neural networks to explore their computational similarities with in vivo neuronal activity recordings.
- Modified the *Brainscore* Python package to include model gradients in the scoring mechanism, aiming to enhance the evaluation of computer vision models against neural activation data.
- Developed valuable understanding of deep learning frameworks, including PyTorch and TensorFlow, through working CNNs with and modifying *Brainscore*.
- Explored contrastive learning techniques to refine representation spaces prior to classification, analyzing how embedding dimensionality impacts learning and generalization abilities.
- Maintained up-to-date knowledge of AI advancements by actively engaging with current research in machine learning and neural network models.

Research Assistant
Clemson University, Department of Electrical and Computer Engineering — **Clemson, SC**

Mentor: Dr. Hai Xiao **May 2020 – August 2020**

- Collaborated with a multidisciplinary team to initiate the development of a viral air sampler during the pandemic, honing skills in scientific literature review and cross-disciplinary communication.
- Delivered weekly presentations on computer vision models trained to detect cellular morphological changes caused by viral infection, contributing research that shaped an NIH grant proposal.

Undergraduate Student Researcher
University of Notre Dame, Department of Chemistry & Biochemistry **Notre Dame, IN**
Mentor: Dr. Marya Lieberman **February 2020 – April 2020**

- Explored click chemistry techniques for drug identification, focusing on developing simple colorimetric assays that change color in the presence of certain drugs.
- Began work on developing a color changing sticker for detecting date rape drugs in beverages.

PUBLICATIONS

- Andreas R. Gschwind*, Kristy S. Mualim*, (…), James Galante, (…), Jesse M. Engreitz. An encyclopedia of enhancer-gene regulatory interactions in the human genome. (in revision). *Nature.*
- IGVF Consortium. Deciphering the impact of genomic variation on function. (2024). *Nature***.**
- Markus Otto Hjalmar Ramste, Chad Weldy, Soumya Kundu, (…), James Galante, (…), Jesse M. Engreitz, Thomas Quertermous. Enhancer-targeting CRISPR screens at coronary artery disease loci suggest shared mechanisms of disease risk. (2025). *medRxiv*.
- Maya U. Sheth, Wei-Lin Qiu, X. Rosa Ma, Andreas R. Gschwind, (…), James Galante, (…), Jesse M. Engreitz, Robin Andersson. Mapping enhancer-gene regulatory interactions from single-cell data. (in revision). *Nature Genetics*.
- Judhajeet Ray, Evelyn Jagoda*, Maya U. Sheth*, James Galante*, (…), Jesse M. Engreitz. An unbiased survey of distal element-gene regulatory interactions with direct-capture targeted Perturb-seq. (2025). *bioRxiv.*

AWARDS & HONORS

- **Hertz Finalist**, Fannie and John Hertz Foundation Fellowship, 2025.
- **Dean's List**, University of Notre Dame (All credit-eligible semesters).
- **Magna Cum Laude**, University of Notre Dame, May 2023.
- **Featured Scientist**, Scientia, Notre Dame's Undergraduate Research Journal, 2023.
- **Scholarship**, Eugene J. Reilly Squires Scholarship for Undergraduate Studies, 2019.

PROJECTS

Power Simulations Pipeline for Single Cell Perturbation Experiments **April 2024 – November 2024**
- Developed a versatile pipeline to optimize cell numbers and design parameters for single-cell perturbation experiments, including CRISPRi/CRISPRko and similar technologies.
- Provided user-friendly simulations of effect sizes and cell counts, enabling experimental biologists to design robust and reproducible studies (https://github.com/jamesgalante/Sceptre_Power_Simulations).
- Collaborating with a team of statisticians to create an R package based on this pipeline.

scRNA-Seq Large Language Model Interpretation **June 2023 – July 2023**
- Ablated attention heads in the scRNA-Seq LLM Geneformer to explore the localization of cell type-specific information throughout the model and within specific attention heads.
- Found that a large proportion of cell-type specific predictions relied on select specialized attention heads, offering insights into how large language models (LLMs) can represent biological data.

Transformers Presentation **May 2023**
- Presented a deep dive into the mathematical intuition behind Transformers for an Artificial Neural Networks class.
- Explained how transformations in latent space contribute to language model understanding, providing both theoretical and practical insights into AI.
- Focused on attention mechanisms and their role in capturing complex dependencies in data.

United Way of St. Joseph County Community Center Analytics **February 2023 – May 2023**
- Collaborated with a community center to create a website showcasing regional financial disparities using census and unstructured data.
- Designed a survey tool to help the center identify areas for outreach and potential locations for new facilities.

- Processed and formatted large datasets, handing off the project for future continuation as the team graduated.

ASL Real-Time Computer Vision Model **March 2022 – May 2022**
- Developed a Convolutional Neural Network for real-time ASL hand movement classification, achieving >95% accuracy.
- Utilized OpenCV, Google's MediaPipe Hands, and Python libraries to create the model and system for live prediction.

Notre Dame Dining Hall Student Traffic Trends **February 2022 – May 2022**
- Analyzed campus dining data to evaluate factors influencing student volume per hour.
- Built predictive models of student traffic, achieving >80% accuracy, and presented findings to dining staff to improve resource management.

MENTORING

Lab Mentor **February 2024 – April 2024**
Lab of Jesse Engreitz **Stanford, CA**
- Mentored rotation student Maggie in processing endothelial differentiation CRISPRi screen data.
- Guided graduate students on clean and reproducible coding practices, computing cluster setups, and statistical analysis of high-throughput CRISPR data.

Lab Mentor **August 2023 – Present**
Lab of Christopher Patzke **Notre Dame, IN**
- Mentor undergraduates on the Miller-Dieker syndrome project, in experimental design, data analysis, and proper computational techniques.

LEADERSHIP

President, Echoes A Cappella **June 2022 – May 2023**
- Directed a 20-member co-ed a cappella group, arranging and recording original music that was released on Spotify.
- Managed logistics for travel and concerts, and coordinated performances for charity events and competitions.

Choreographer, Keenan Revue **December 2021 – February 2022**
- Choreographed dance performances for the Keenan Revue, a renowned campus-wide annual variety show attended by thousands, directing over ninety people.

Environmental and Gender Commissioner **August 2021 – May 2022**
- Organized initiatives within the dorm community to promote sustainability practices.
- Planned events and facilitated discussions on gender with other dorms.

Captain, High School Diving Team **August 2018 – May 2019**
- Assumed coaching responsibilities for the diving team during the coach's absence effectively half the week, managing practices and guiding younger team members.

SKILLS

- **Programming Languages:** R, Python, C, Bash, C++, MATLAB, JavaScript, HTML, CSS
- **Bioinformatics Tools:** Pipelining, NCBI Databases, Bioconductor Packages
- **Computational Analysis:** Statistical Modeling, Power Simulations, Model Interpretation
- **Machine Learning & AI:** PyTorch, TensorFlow, Deep Learning, Computer Vision
- **Software & Applications:** GitHub, Microsoft Office, Adobe Creative Suite