

Education

College of Biological Sciences

Expected graduation Summer 2027

University of Minnesota Twin Cities,

Bachelor of Science in Biology, Minor in Computer Science

Dean's List, Spring 2026

Research Experience

The Hormel Institute

May 2026 - Present

SURE Research Intern (full-time, Summer 2026); continued manuscript collaboration

Lab PI: Robert Clarke, PhD

- Investigate metabolic reprogramming and therapeutic vulnerabilities associated with endocrine resistance in breast cancer, with emphasis on mitochondrial metabolism, succinate–fumarate metabolism, and cellular responses to altered oxygen availability.
- Independently maintained breast cancer cell cultures and performed protein preparation, Western blotting, and cell-growth and migration assays to characterize endocrine-resistance-associated phenotypes.
- Developed a protocol, with mentor feedback, to investigate whether oxygen availability contributes to the hypoxic-like metabolic phenotype of resistant breast cancer cells. Analyze and interpret experimental results from complementary approaches including metabolic assays, imaging, flow cytometry, Seahorse analysis, and isotope-tracing studies.
- Draft and revise assigned sections of an ongoing manuscript, synthesizing relevant literature and evidence.
- Presented research findings through a scientific poster and short research presentation at the Hormel Institute summer research symposium.

Pharmaceutics Laboratory Volunteer (Part-time)

February 2025 - April 2026

Assistant Professor Ameya Kirtane

- Supported research on mRNA-based cancer therapeutics and lipid-nanoparticle delivery systems through experimental formulation development and computational screening.
- Used a Uni-Mol-based modeling pipeline to generate predictions for lipid-nanoparticle formulations and assist with prioritization of candidate compositions for experimental testing.
- Performed molecular biology workflows including in vitro transcription, mRNA purification using spin-column methods, and nucleic-acid quantification with NanoDrop.
- Conducted biomaterial preparation and modification, including acrylate conjugation to chitosan for downstream formulation and experimental applications.

Course-Based Undergraduate Research Project, Biology Lab

September 2024 - December 2024

University of Minnesota Twin Cities

- Conceived and led a three-student independent research project investigating how caffeine exposure influenced the response of *Escherichia coli* to antibiotic treatment.
- Developed the research question and experimental methodology, including treatment design, comparison conditions, culture and plating strategy, and allocation of experimental tasks.
- Took primary responsibility for experimental execution, including bacterial culture, plating, antibiotic-treatment experiments, microscopy, and assessment of bacterial growth and phenotypic responses.
- Led comparison and interpretation of results across treatment conditions and coordinated preparation and presentation of the team's findings.

Literature Review and Research Assistant (Part-time)

September 2023 - November 2024

Professor Elise Toedt

- Contributed to a collaborative research project with Minnesota nonprofit Upstream Arts examining multidimensional education and arts-based approaches for disabled communities.
- Conducted literature searches and reviewed, organized, and synthesized academic sources, maintaining relevant publications and citations in a shared Zotero library.
- Identified themes and connections across interdisciplinary literature and helped translate research findings into materials for academic and community audiences.
- Contributed to the development and presentation of project findings, including work presented at the 2025 Conference on College Composition and Communication.

Presentations

- Pan, M., Yadav, A. K., & Clarke, R. *Mapping Endocrine Resistance–Associated Phenotypes and SDH-Linked Metabolic Vulnerability in Breast Cancer Cells*. The Hormel Institute Summer Research Symposium, 2026. Poster and flash presentation.
- Pan, M., Isaac, L., Ibrahim, S., & Toedt, E. *Remixing First Year Writing with a Critical Disability and Arts-Based Focus*. Conference on College Composition and Communication (CCCC), 2025. Oral presentation.

Research & Technical Skills

Cell & Molecular Biology: Mammalian cell culture, bacterial culture, Western blotting, protein preparation, in vitro transcription, mRNA purification, spin-column purification

Cellular & Metabolic Assays: Incucyte live-cell imaging, scratch-wound assays, flow cytometry, Seahorse metabolic analysis, SDH activity assays, NanoDrop spectrophotometry, microscopy

Computational & Bioinformatics: Python and C programming; relational database querying with SQL; data analysis and visualization in R; use of Uni-Mol–based modeling pipelines for lipid-nanoparticle formulation screening; NCBI and UCSC databases and ExPASy tools for gene and protein characterization and sequence searches; DNA and protein sequence analysis and alignment; molecular evolution, expression, and promoter analysis; basic protein structure prediction and structural analysis

General Research Skills: Experimental design, protocol development and troubleshooting; experimental data interpretation; literature searching and evidence synthesis; Zotero reference management; manuscript drafting and revision; scientific poster preparation and oral presentation

Work Experience

Training Specialist Intern

May 2024 - October 2024

Haleon Co., Ltd

(former GlaxoSmithKline Consumer Healthcare Co., Ltd)

- Analyzed training activity data for retail personnel and summarized participation and performance trends.
- Prepared reports on seasonal training progress, retail activity, and market growth trends to support internal evaluation and planning.

Volunteer Experience

Digital Navigator

October 2024 - Present

M Health Fairview Clinics and Surgery Center

- Provide one-on-one technical assistance to patients and community members by navigating MyChart and other digital healthcare tools, including support for individuals with limited digital experience.
- Troubleshoot access and usability and contribute user feedback toward improving accessibility of digital services.