Mariam Elsharkawy

Analytically driven and persistent, currently pursuing insightful opportunities in biomolecular & chemistry research fields.

(832) 206 - 2770

✉ elsharkawyhmariam@gmail.com

LinkedIn: /mariam-elsharkawy-369268217

EDUCATION

Rice University- *Houston, Texas* 2023-2027

B.S. in Chemistry, Minor in Data Science **GPA**: 3.96/4.00

Accelerated B.S-M.S.-Ph.D. in Biochemistry & Cell Biology **GPA**: 4.00/4.00

Relevant Courses:

Biophysics, Computational Biology Modeling, Molecular Basis of Disease, Biostatistics, Biochemistry 1&2, Physical Chemistry 1&2, Honors Organic Chemistry 1&2, Honors Organic Chemistry Lab, Biochemistry Lab, Chemical Measurements Lab, Data Science Tools & Models, Machine Learning

EXPERIENCE

Structural Biochemistry Research Assistant, Yang Gao Lab, Rice University

August 2024 – Current

○ Investigated the structural and biochemical basis of RNA editing by ADAR enzymes using *in vitro* and computational modeling, and cryo-EM

○ Developed an *in silico* screening pipeline utilizing AlphaFold, PyMOL, and molecular docking tools to model RNA-protein and protein-protein complexes and predict structure-function relationships

○ Designed a novel RNA immuno-precipitation pulldown experiment and analyzed mass spectrometry results to characterize RNA-protein interactions, focusing on ADAR1 and its regulation by interferon-stimulated proteins

○ Performed mutagenesis, protein purification, and RNA-binding assays to assess editing specificity and mechanistic differences across ADAR isoforms

○ Mentored an international exchange student from *National Taiwan University* as part of the MACHI research program for 2 months and 3 high school students for a summer, guiding them through experiments and research

Therapeutics Discovery & Development Intern, MD Anderson Cancer Center

June 2024 – August 2024

○ Selected for a highly competitive summer internship at the Therapeutics Discovery & Development (TDD) division at MD Anderson Cancer Center

○ Utilized high-throughput drug screening assays to assess in vivo Pharmacokinetic and in vitro ADME (Absorption, Distribution, Metabolism, and Excretion) properties of small molecule cancer therapeutics using Xevo and Agilent triple quadrupole LC-MS/MS

○ Conducted PAMPA (parallel artificial membrane permeability assay), PPB (plasma protein binding), PK (in vivo pharmacokinetics)

○ Validated Tissue Protein Binding as a novel in-house assay to service the Institute for Applied Cancer Sciences (IACS) drug discovery platforms

Biochemistry & Cell Biology Research Assistant, Natasha Kirienko Lab, Rice University

January 2024 – April 2024

○ Researched drug repurposing for treatments of neurodegenerative diseases using the *C.elegans* model system by quantifying β-amyloid accumulation and paralysis

Chemical Engineering Internship, Hargrove Engineers & Constructors Firm

January 2023 - May 2023

○ Selected for a highly competitive high school internship (only one of four students from my school) at a local engineering firm

○ Created piping & instrumentation diagrams (P&ID) and process flow diagrams using AFT Fathom & AFT Arrow simulation softwares

○ Calculated P&IDs for renewable-energy production to convert sustainably-sourced wood chips to fuel for a client

Predicting Pharmacokinetics Based on Drug Structure, *Independent Project*

August 2022 - November 2022

○ As part of an independent project, I developed & tested various machine learning models to predict a drug's pharmacokinetics and ADME properties based on its structural information data

○ Used the SMILES (simplified molecular-input line-entry system) data type to represent chemical structure in the Google Colab IDE

○ Developed & tested various machine learning models to predict a drug's pharmacokinetics and ADME properties based on its structural information data

Predicting Miscarriage Using Vaginal Microbiome Data, University of California-San Francisco

July 2022

○ Selected for a highly competitive high school summer program, AI4ALL, at the University of California-San Francisco to apply machine learning to biomedicine

○ Developed decision tree, random forest, logistic regression, perceptron, & k-means clustering machine learning models to predict the likelihood of miscarriage

○ Analyzed pregnant vaginal microbiomes by identifying the abundance of bacteria strains using genome sequencing & alignment

○ Learned & applied data visualization, feature engineering, supervised learning algorithms, unsupervised learning algorithms, and neural networks using Python

Computational Neuroscience Research Assistant, Kimberley Tolias Lab, Baylor College of Medicine
August 2021 – August 2022
○ Focused on understanding the molecular mechanisms that control the formation of neuronal connections using computational image processing
○ Analyzed dendrites of hippocampal neurons from fluorescent microscopy images using ImageJ

Founder of The Plastic Pollution Solution, *Houston, Texas*
November 2019 - Present
○ Founded a non-profit organization that creates a global initiative to raise awareness about plastic pollution
○ Created a website, informational videos and YouTube channel, and blog
○ Hosted several plastic pollution awareness presentations in my local community that discuss the issue of plastic pollution, alternatives to single-use plastic, how to recycle, and repurposing plastics
○ Created a mural out of repurposed plastic that serves as a permanent art exhibit at the Goodykoontz Museum of History in Downtown Houston, which continually raises awareness about plastic pollution to the museum's visitors

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PUBLICATIONS

1. Deng, X*, **Elsharkawy, M***, & Gao, Y. (2026). "Structural and mechanistic basis of ADARI-mediated RNA editing and immune regulation". *Cell Insight*, 5(2). doi:https://doi.org/10.1016/j.cellin.2026.100299
   *Equal contribution.
2. **Elsharkawy, M**, Nguyen, P, Jiang, Y. (2024). "Plasma Protein Binding (PPB) & Tissue Binding as High-Throughput Assays to Quantify the Free Fraction of Novel Cancer Therapeutics" *CATALYST Summer Training Program*. doi:https://doi.org/10.52519/00170
3. **Elsharkawy, M**. (2024). "Attractions: Review of Magnetic Microbubbles for Drug Delivery". *Rice Undergraduate Science Research Journal Catalyst* Volume 15, 2023-2024. doi: https://doi.org/10.25611/ST85-9S15

PRESENTATIONS & CONFERENCES

American Chemistry Society (ACS) Spring 2026, Atlanta, GA
Selected Speaker; ACS Award for Creative Invention March 2026

6th Annual GCC Cellular and Molecular Biophysics Conference, Houston, TX
Selected Speaker; Lightning Talk November 2025

2025 Welch Foundation Conference "New Horizons in Drug Discovery", Houston, TX
Poster- "Investigating ADAR1 Regulatory Interactomes to Advance RNA Editing Therapeutics" October 2025

Gulf Coast Undergraduate Research Symposium (GCURS), Houston, TX
Speaker- "Investigating ADAR1 Regulatory Interactomes to Advance RNA Editing Therapeutics" October 2025

Rice Synthetic Biology Institute (RSBI) Retreat, Houston, TX
Poster- "Investigating ADAR1 Regulatory Interactomes to Advance RNA Editing Therapeutics" October 2025

Rice University Chemistry Undergraduate Research Symposium (CURS), Houston, TX
Poster- "Investigating ADAR1 Regulatory Interactomes to Advance RNA Editing Therapeutics" July & Dec. 2025

Smalley-Curl Institute Colloquium, Houston, TX
Poster- "Investigating ADAR1 Regulatory Interactomes to Advance RNA Editing Therapeutics" July 2025

MD Anderson Cancer Center, CATALYST Summer Training Research Symposium, Houston, TX
Poster- "Plasma Protein Binding & Tissue Binding to Quantify Free Fraction of Cancer Therapeutics." August 2024

Rice University Natural Sciences Undergraduate Research Symposium, Houston, TX
Poster- "SSRIs as Mitophagy-Dependent Treatments for Neurodegenerative Diseases" May 2024

AWARDS & HONORS

Russell Shearn Moody Pathway to Research in the Natural Sciences Undergraduate Research Fellowship
1 of 6 students from Rice University to be selected. ($10,000 prize) May 2026

Rice Undergraduate Scholars Program (RUSP), Rice University ($1000 prize) May 2026

Summit Scholarship, Mountaineering for Young Women ($5000+ prize) February 2026

Continuing Research Excellence Student (CREST) at Rice University ($1500 prize) January 2026

President's Honor Roll Fall 2023, Fall 2024, Fall 2025

Most Outstanding **Presentation Award**, Gulf Coast Undergraduate Research Symposium (GCURS) October 2025

3rd Place **at the Entrepreneurship BioChallenge,** hosted by Nucleate Texas ($1000 prize) October 2025

American Chemistry Society (ACS) Travel Award, Rice Department of Chemistry ($750 prize) September 2025

1st Place **at the Rice Summer Chemistry Undergraduate Research Symposium (CURS)** ($100 prize) July 2025

Zevi & Bertha Salsburg Memorial Fellowship in Chemistry ($5000 prize) May 2025

Sustaining Excellence in Research (SER) Scholar at Rice University ($1800 prize) April 2025

National Merit Scholar May 2023

AP Capstone Diploma, 2 Year Research-Intensive Curriculum. *1 of 3 at high school to achieve diploma* June 2022

Girl Scout Gold Award May 2022

ON-CAMPUS ACTIVITIES

Rice Office of STEM Engagement (R-STEM)- *Outreach Volunteer & Education Researcher* 2026

Catalyst Rice Undergraduate Science Journal- *Writer*	2023-2024
Muslim Student Association- *Religious Coordinator & New Student Representative*	2023-2025
Baker College- *Peer Academic Mentor*	2024-2025
Rice Birding Club- *Member*	2025-2026

SKILLS

Computational: Alphafold, PyMol, Predictomes, ImageJ, Java, Python, R, MATLAB, SQL, Machine Learning

Laboratory: Synthetic Organic Chemistry, Spectroscopy, Microscopy, PCR, Gel Electrophoresis, Protein expression & Purification, Western Blot, Biochemical Assays

Miscellaneous: Fluent in Arabic & English. Limited Proficiency in Spanish. Experienced in Google Suite, Videography, & Photography