MARIUM YOUSUF
Curriculum Vitae
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RESEARCH VISION
Develop robust data-driven frameworks for understanding the complex dynamics of the brain, with a particular emphasis on modeling functional and effective connectivity in neural systems.

EDUCATION
Ph.D. in Applied Mathematics (Ph.D. Candidate)	expected Spring 2026
M.S. in Applied Mathematics	Aug 2023
M.S. in Computer Science	May 2022

University of Arizona, Tucson AZ

B.S. in Mathematical Sciences, *summa cum laude*	Dec 2017

Northern Illinois University, DeKalb IL

Associates in Science	May 2015

McHenry County College, Crystal Lake IL

ACADEMIC APPOINTMENTS

PhD Student, University of Arizona (UArizona)

Research

Department of Mathematics	Fall 2022 - Present

Developing a probabilistic graphical model to extract neural functional connectivity from spike trains.
Keywords: Replay, Brain Connectivity, Causal Discovery, Network Inference, Stochastic Modeling
Advisors: Jean-Marc Fellous, Michael Chertkov

Department of Computer Science	Fall 2019 - Spring 2022

Implemented an approximation of G-Wishart marginal likelihood to learn sparse graphical structures representing different levels of functional brain connectivity.

Instructor

Elements of Calculus, Dept. of Mathematics	Summer 2024, Summer 2025
College Algebra, Dept. of Mathematics	Spring 2024, Spring 2025
Calculus Preparation, Dept. of Mathematics	Fall 2023

Teaching Assistant

Understanding Data, Dept. of Mathematics	Spring 2023
College Algebra, Dept. of Mathematics	Fall 2022
Discrete Data Structures, Dept. of Computer Science	Fall 2019, Yr. of 2021

Graduate Research Aide, Argonne National Laboratory	Summers 2021-2023

Project Title: Robust Automation for Connectomics
Developed methods for automated image processing of high-throughput TEM and X-ray mouse brain images in Python, as well as, for efficient integration with external visualization systems (such as WebKnossos and NeuroGlancer) with the goal of improvement over existing tool chains such as TrakEM2 that require human intervention.

Graduate Research Assistant, Missouri University of Science and Technology

Department of Computer Science	Fall 2018 - Summer 2019

Pre-processed and analyzed data collected from dementia patients at Phelps Health, MO to infer the role of sedentary body movements in early diagnosis of dementia.

Pre-Doctoral Intern, Argonne National Laboratory

Leadership Computing Facility	April - August 2018

Research Aide
Built Python tools for efficient visualization of real-time data from sensors located in Chicago for an Array of Things project.

Lecturer, Big Data Visualization Camp

Prepared materials on Big-Data visualization using Python and Jupyter Notebook and lectured in a three-day camp for rising high-school seniors.

Undergraduate Research Aide, Argonne National Laboratory

Leadership Computing Facility — Summer 2017

Configured Apache Spark in Jupyter Notebook to analyze real-time simulated data for visualization tasks.

Undergraduate Teaching Assistant, Northern Illinois University (NIU)

UNIX and Networking, Dept. of Computer Science — Fall 2017

CONFERENCE ACCEPTANCES

Poster Presentation, *Society for Neuroscience* — November 2025

Marium Yousuf, Laurent Pagnier, Misha Chertkov, Jean-Marc Fellous (2025, November 15-19). Causality in Replay: Detecting Effective Connectivity from Spike Trains. Neuroscience 2025, Society for Neuroscience, San Diego Convention Center.

Poster Presentation, *National Institute for Theory and Mathematics in Biology* — August 2025

Marium Yousuf, Laurent Pagnier, Misha Chertkov, Jean-Marc Fellous (2025, August 11-18). Causality in Replay: Detecting Effective Connectivity from Spike Trains. NITMB MathBio Convergence Conference 2025, The Drake Hotel, Chicago.

Poster Presentation, *Society for Neuroscience* — October 2024

Marium Yousuf, Misha Chertkov, Jean-Marc Fellous (2024, October 5-9). Hippocampal Replay and Sleep's Hidden Language: Methods for Detecting Functional Connectivity from Spike Trains. Neuroscience 2024, Society for Neuroscience, McCormick Place in Chicago.

Contributed Talk, *Arizona Women's Symposium in Mathematics* — September 2024

Marium Yousuf, Misha Chertkov, Jean-Marc Fellous (2024, September 20-21). Hippocampal Replay and Sleep's Hidden Language: Methods for Detecting Functional Connectivity from Spike Trains. AWSiM 2024, Arizona Women's Symposium in Mathematics, Flagstaff, AZ.

Poster Presentation, *Arizona Women's Symposium in Mathematics* — November 2023

Marium Yousuf, Misha Chertkov, Jean-Marc Fellous (2023, November 17-19). Detecting replay in multi-unit spiking data: Bayesian networks. AWSiM 2023, Arizona Women's Symposium in Mathematics, Flagstaff, AZ.

Poster Presentation, *Society for Neuroscience* — November 2023

Marium Yousuf, Misha Chertkov, Jean-Marc Fellous (2023, November 11-15). Detecting replay in multi-unit spiking data: Bayesian networks. Neuroscience 2023, Society for Neuroscience, Washington D.C.

ADDITIONAL ACADEMIC TRAINING

UArizona Research Training Group — Fall 2024, Fall 2025

Funded through NSF-supported research group focused on modern computational methods for data-driven modeling and applications.

Simons Laufer Mathematical Sciences Institute — Summer 2025

Selected to attend a summer graduate workshop on Local Limits of Random Graphs held at Université Paris-Saclay Mathematics Institute in France.

Center for the Integration of Research, Teaching, and Learning (CIRTL) — Fall 2021 - Present

Completed Level I (*Associate*) and Level II (*Practitioner*) designations in the CIRTL's three-tiered teaching certificate program, with training in evidence-based undergraduate STEM teaching.

PROFESSIONAL DEVELOPMENT

Mentor, STAR Lab, UArizona — 2024-Present

Mentoring high school seniors on conducting a research project involving neural data simulation

Vice President, SIAM UArizona Chapter — 2025-2026

Presenter (invited) Human Augmented Analytics Group, Georgia Institute of Technology   April 2025
Presenter (invited), Graduate Interdisciplinary Programs Student Research Showcase, UArizona   2024
Treasurer, SIAM UArizona Chapter   2024-2025
    Secured 490 USD funds from the SIAM board and assisted in planning chapter events
    Co-organized SIAM mini-conference for graduate students from diverse disciplines
Panelist, Graduate Teaching Assistants' Orientation and Training, UArizona   August 2024
    GTA training for incoming graduate students in the Dept. of Mathematics
Mentor, Undergraduate Mathematical Modeling, UArizona   Spring 2024
    Mentoring undergraduate team for a capstone project on learning language models using Markov Chains
Volunteer, Outreach Program BASIS Oro Valley High School, Oro Valley AZ   March 2023, 2024
    Brain- and memory-inspired educational activities for 6th-graders
Presenter, Annual Graduate Research Symposium, Intelligent Systems Center, Rolla MO   2019
Volunteer, Hopper for Grace Hopper Conference   2018

AWARDS, HONORS, AND SCHOLARSHIPS

Grogan Scholarship Award (6000 USD), Dept. of Mathematics, UArizona   Fall 2025
Herbert E. Carter Travel Award (600 USD, 100 USD), Graduate College UArizona   October 2024, 2023
TA of the Month, Dept. of Computer Science, University of Arizona   October 2021
Grace Hopper Student Scholar   October 2019
Norma K. Stelford Mathematics Endowment, NIU   December 2017
    (graduating senior in mathematics with the highest GPA)
The Clarence Ethel Hardgrove Mathematics Scholarship, NIU   2015-2016
    (incoming transfer with excellent prior record in mathematics)
International Undergraduate Scholarship, NIU   Fall 2015 - Fall 2017