Mai Al Shaaban

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Education

Brandeis University Jan. 2024 – May 2026
B.S. in Applied Mathematics, B.A. in Computer Science (Honors Thesis in Progress) *Waltham, MA*
**Transferred from Southern Illinois University–Edwardsville (SIUE), Aug. 2022 – Dec. 2023*

Relevant Coursework: Algorithms, Big Data and Numerical Methods (Including Scientific Computing), Machine Learning (Including Deep Learning), Data Structures, Computer Systems, (Real & Fourier) Analysis, Probability.

Summary

Machine Learning researcher (Computational Fluid Dynamics (CFD) and Computational Neuroscience); Mathematics Department Undergraduate Representative; Student Union Head Treasurer and Executive Board Member; Teaching Assistant for Operating Systems and Machine Learning.

Research Experience

Research Assistant, Machine Learning in CFD Sept. 2025 – Present
Jackson State University, Texas A&M University, and University of Texas at Arlington *Remote*

- Collaborative work with faculty across three institutions on machine learning methods for CFD, including flow decomposition, neural-network-based time-series forecasting, and 3D vortex structure prediction.

Senior Honors Thesis, Computational Neuroscience Sept. 2025 – Present
Brandeis University, Department of Mathematics & Volen National Center for Complex Systems *Waltham, MA*

- Modeling basal ganglia transitions from goal-directed to habitual learning using behavioral data from mice, with differential-equation–based and Reinforcement Learning (RL) approaches to capture dopamine-dependent striatal dynamics.

Research Student, Undergraduate Mathematics Research at Yale (SUMRY) June 2025 – August 2025
Yale University, Department of Mathematics *New Haven, CT*

- Selected as one of 19 students (10 non-Yale) to participate in this highly competitive research program.
- Appointed **Evaluation Chair** to represent students and provide feedback on program as a whole at the end.
- Led daily research discussions for the Machine Learning in Computational Fluid Dynamics (CDF) group of 4.
- Developed a complete pipeline from scratch to preprocess and analyze complex CFD simulation data, identifying vortex structures and extracting features for modeling.
- Applied methods (POD, NMF) to reduce dimensionality and uncover patterns in high-dimensional data.
- Designed deep learning transformers-based models to predict time series of fluid flow features from simulation metadata; Integrating learned models with Navier–Stokes solvers to speed up simulations while preserving physical consistency and accuracy.
- Led two Community Seminars throughout the program: *Women in Mathematics & Forbidden Mathematics*
- Recruited to collaborate with CFD research groups at Jackson State University, Texas A&M, and the University of Texas at Arlington.

Research Assistant Feb 2024 – April 2024
Brandeis University Guided Reading Research Program (GRP) *Waltham, MA*

- Collaborated with a fellow undergraduate student and a PhD scholar to study Clifford Algebra concepts.
- Participated in weekly meetings to discuss abstract algebra topics and track research progress.
- Developed skills in communicating mathematical concepts through discussions and a final presentation to members of the Math department.

Undergraduate Research Assistant Jan 2023 – Dec 2023
Southern Illinois University Edwardsville (SIUE) School of Business *Edwardsville, IL*
Undergraduate Research and Creative Activities (URCA) Program

- **Evaluating Pension Plan Performance in Missouri and Illinois:**
  - Conducted research on pension plans with a professor in the Economic and Finance department.
  - Collected and analyzed data, identifying the 5 best/worst plans based on 20-year investment returns.
- **Research on Personifying Alexa and AI Code Effectiveness:**
  - Worked with a professor in the Computer Management and Information Systems department.
  - Researched Alexa personification's impact on reviews; Scripted data from local and global seller websites (BestBuy, Amazon, ASDA, Tesco, FlipKart).
  - Contributed to a project on AI code effectiveness on GitHub with another department professor.

Publications

1. Yong Yang, Caixia Chen,Yonghua Yan, **Mai Al Shaaban** *Computational Analysis of Two Micro-Vortex Generator Configurations for Supersonic Boundary Layer Flow Control.* Journals, Processes, vol. 13, no. 9, 10.3390/pr13092818, 2025. DOI

Teaching Experience

Teaching Assistant (Introduction to Machine Learning) ***Incoming...*** January 2025 – Present
Brandeis Michtom School of Computer Science *Waltham, MA*

- Selected as one of three undergraduate TAs for the course.
- Responsibilities include grading programming assignments, problem sets, and exams, holding office hours, and leading recitation sessions.

Teaching Assistant (Fundamentals of Computer Systems (Operating Systems)) August 2025 – Present
Brandeis Michtom School of Computer Science *Waltham, MA*

- Design and co-lead bi-weekly recitations and host weekly hours to support students in this challenging course.
- Grade 3 quizzes and assignments, together accounting for 90% of students' final course grades.
- Provide structured feedback to the course instructor through regular meetings on student progress.
- Invited to continue as a TA in Spring 2026, with continued responsibilities including grading programming assignments, problem sets, and exams, as well as leading recitations and holding office hours.

Teaching Assistant (Advanced Programming Techniques in Java) July 2025 – Aug 2025
Brandeis Michtom School of Computer Science *Remote*

- Sole TA selected to support the course alongside the instructor, providing comprehensive student assistance.
- Hosted weekly 5-7 virtual office hours to help students with the materials.
- Graded programming assignments, contributing 40% - 50% of the students' course grades.
- Contributed in grading students final oral exam.
- Met regularly with the course instructor to align on expectations and share feedback from a TA's perspective.

Teaching Assistant (Enrichment Sessions Leader) Aug 2023 – Dec 2023
SIUE Department of Mathematics and Statistics *Edwardsville, IL*

- Led 2 weekly sessions for Calculus I students, testing their understanding of materials in groups.
- Graded worksheets, contributing 10% - 15% to students' course grades on a weekly basis.
- Collaborated with faculty and the enrichment sessions coordinator to align sessions with the curriculum.

Professional Experience

Data Science Intern May 2024 – Dec 2024
Juvena Therapeutics *Remote*

- Documented data preparation processes to enable optimal analysis and visualization, performing data collection, preprocessing, cleaning, and integration across 15+ in-house and public (RNAseq and protein) datasets for 3 major company research projects on disease studies.
- Generated actionable insights for biologists and pharmacists by applying statistical modeling, clustering, and exploratory data analysis with optimized visualization tools.
- Improved team alignment and project visibility by providing weekly updates to the supervisor, presenting bi-monthly to the data science team, and delivering a final summary presentation to the company.

Data Scientist Jan 2025 – May 2025
Brandeis University Branda App Development Team *Waltham, MA*

- Worked with a fellow to integrate transportation data from WhatEvent and MBTA into the Branda app, using machine learning to enhance real-time transit recommendations.
- Presented findings to the team and supported development by translating data insights into improved app features.

Inter-library Loan Student Supervisor (Previously Assistant) Jan. 2024 – Present
Brandeis Goldfarb Library *Waltham, MA*

- Promoted at the start of Fall 2025 to serve as Student Supervisor in the Inter-library Loan office.
- Process hundreds of lending and borrowing requests between Brandeis and partner universities worldwide.
- Handle high-volume digital requests for specific articles/book chapters, ensuring timely delivery to faculty/students.

Resident Assistant March 2023 – Dec 2023
SIUE Housing *Edwardsville, IL*

- Fostered a safe environment, conducted mediation sessions, and enforced policies while supporting 37 residents in the first semester (2 buildings) and 64 residents in the second semester (3 buildings).
- Collaborated with RAs, pro-staff, and faculty for events, and attended a weekly class on leadership and interpersonal skills.

Leadership And Mentorship Experience

Student Union Executive Board Member
Head Treasurer (Now) & Deputy Treasurer (Previously) Jan. 2024 – Present
Brandeis University Student Union (SU) *Waltham, MA*

- Selected to serve as Co-Head Treasurer for the 2025–2026 academic year, co-overseeing financial operations for approximately 200 student clubs, co-managing SU finances, and co-leading the SU treasurers team of 12.
- Processed over 240 club payments across three semesters and coordinated with the university budget office.
- Monitor budget progress and provide financial reports through regular meetings with the budget analyst.
- Represent the treasury at Student Union retreats and meetings.
- Conduct training sessions for club treasurers on financial procedures.
- Lead semester-end budget reconciliation for all clubs.

Vice President (Now) & Event Coordinator (Previously) Jan. 2025 – Present
Girls Who Code (GWC) Brandeis Chapter *Waltham, MA*

- Elected to serve as Vice President for the 2025–2026 academic year.
- Preparing for the 1st conference at Brandeis organized by a students' club on Sep. 13th, 2025.
- Organized GWC Galentine's Day event (featured in the Student Engagement February 2025 Newsletter).
- Planned, coordinated, and executed events, collaborating with internal clubs while ensuring requirements are met, managed timelines, and handled last-minute changes.

Undergraduate Departmental Representative 2025–2026 Academic Year
Brandeis University, Department of Mathematics *Waltham, MA*

- Selected to represent undergraduates in departmental discussions on curriculum and community activities.
- Organize events, seminars, faculty talks, and information sessions on diverse mathematical topics.
- Collaborate closely with 2 peer UDRs and faculty/staff to strengthen community connections.

Mentor Feb 2025 – April 2025
Brandeis University Department of Mathematics *Waltham, MA*

- Mentored 5 students weekly in 50-minute sessions, advising on math majors, courses, and career opportunities.
- Helped students pick degree paths and find summer jobs, internships, and other university programs.
- Used my experience to guide students in their academics and career plans as a Math Department mentor.
- Led talks on math degree options helping students match their goals with available courses and resources.

Team Lead (Now) & Mentor (Previously) May 2023 – Present
Syrian Youth Empowerment (SYE) *Remote*

- Mentored 3 students through the one-year program, providing 1:1 guidance on college admissions, and typically mentor 2 new students annually each cycle.
- Organize weekly/bi-weekly meetings to track progress, ensure deadlines were met, and assist with application submissions. Along with monitoring important dates and setting reminders.
- Promoted to Team Lead to supervise a group of mentors and mentees and support their overall progress.

Technical Skills and Languages

Programming Languages: Java, Python, C/C++, JavaScript, R, MATLAB, LaTeX
Libraries: pandas, NumPy, SciPy, Matplotlib, scikit-learn, TensorFlow, Keras, PyTorch, Seaborn
Developer Tools: Google Cloud Platform, VS Code, Visual Studio, PyCharm, Eclipse, Paraview
Other Technical Tools: Workday, Latte, Moodle, Google Suite (Slides, Docs, Sheets, Calendar), Canva, Calendly
Spoken Languages: Arabic (Native), French (Upper-Intermediate)

Honors and Awards

- Student Leader of the Month (Nov. 2025), for my role as Student Union Head Treasurer.
- Provost's Undergraduate Research Fund (Oct. 2025), for my research accepted at MIT IEEE URTC 2025.
- Gift Membership in the Association for Women in Mathematics AWM (Sep. 2025), after submitting two abstracts (that later got accepted) into the Joint Mathematics Meeting (JMM 2026).
- The Computational Neuroscience Training Grant Fellowship, $14,100 (March 2025), *Declined*, an internal grant by Brandeis University Division of Science, which was awarded based on my research proposal, supported by Dr. Jonathan Touboul.
- Math Mentor Award (Spring 2025), for serving as the Mathematics Department Undergraduate Mentor.
- Bertha A. Sigilman Endowed Scholarship (2024 - 2025 academic year).
- Student Leader Prize - Awarded for supporting SU treasury (Spring & Fall 2024, Spring & Fall 2025).
- Dean's List Scholar(Fall 2022, Spring & Fall 2023, Spring 2024, Spring & Fall 2025).
- AMY Fund Scholar - Recognized for academic excellence and community involvement (2023).
- Recognized twice with a prize for involvement in SIUE URCA (Spring & Fall 2023).
- Selected as one of only 5 SIUE student representatives at the National Honors College Honors NHCH Conference in Chicago (Nov. 2023).
- Member and President of The National Society of Collegiate Scholars (NSCS) SIUE Chapter (2023).
- Honored with a certificate for presenting a paper in the Central States Communication Association (CSCA) Undergraduate Honors Research Conference (April 2022).

Conferences & Presentations

Joint Mathematics Meetings (JMM) 2026, Abstract & Poster Jan. 2026
AMS/MAA Joint Mathematics Meetings *Washington, DC*
- *Estimating Flows of Partial Differential Equations using Time-Series Analysis.* Abstract

Joint Mathematics Meetings (JMM) 2026, Abstract (Accepted) Jan. 2026
AMS/MAA Joint Mathematics Meetings *Washington, DC*
- *Machine Learning-Based Vortex Evolution in 3D High-Speed Flows.* Abstract

MIT Undergraduate Research Technology Conference (URTC), Institute of Electrical and Electronics Engineers (IEEE), Poster Oct. 2025
Massachusetts Institute of Technology *Cambridge, MA*
- *Machine Learning-Based Vortex Evolution in 3D High-Speed Flows.* Conference Site, Details

The 10th Annual Meeting of Society of Applied and Industrial Mathematics (SIAM), Central States Section, Mini-symposium talk (Accepted) Oct. 2025
University of Arkansas *Fayetteville, AR*
- *A spatiotemporal decomposition-based prediction method for High-Speed Complex Fluid Dynamics.* Abstract

Young Mathematicians Conference (YMC), Talk Aug. 2025
The Ohio State University *Columbus, OH*
- *Estimating Flows of Partial Differential Equations using Time-Series Analysis.*

Jane Street NYC Math Day, Poster July 2025
Jane Street *New York, NY*
- *Machine Learning-Based Vortex Evolution in 3D High-Speed Flows.*

Yale & Williams Math Programs Combined Mini Conference, Talk Aug. 2025
Yale University *New Haven, CT*
- *Estimating Flows of Partial Differential Equations using Time-Series Analysis.*

SUMRY Community Seminars, Organizer/Speaker Jun.–Aug. 2025
Yale University *New Haven, CT*
- *Women in Mathematics.*
- *Forbidden Mathematics.*

Brandeis Mathematics Guided Reading Program, Talk Apr. 2024
Brandeis University *Waltham, MA*
- *Clifford Algebra Overview.* Program Website

AI-Powered Women Conference Sep. 2025
Massachusetts Institute of Technology (MIT) *Cambridge, MA*
- Attendee. Conference Website

The 33rd Annual Technology Conference Apr. 2025
Harvard Business School *Cambridge, MA*
- Attendee. Conference Website

National Collegiate Honors Council (NCHC) Annual Conference Nov. 2023
NCHC *Chicago, IL*
- Attendee. Conference Website

Central States Communication Association (CSCA) Conference Apr. 2023
CSCA *St. Louis, MO*
- Paper Presenter: "The Fantasy of Small World" Conference Website