Anwar Khaddaj

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Education

Arizona State University - Tempe, Arizona — Aug 2025 - Present
PhD, Applied Mathematics, GPA: 4.0/4.0
Fully Funded Teaching and Research Assistantships

Rice University - Houston, Texas — Aug 2022 - May 2025
MA, Computational and Applied Mathematics, GPA: 3.92/4.0
Fully Funded Fellowship and Research Assistantship

Lebanese American University - Beirut, Lebanon — Aug 2019 - May 2022
BS, Mathematics with High Distinction, Minor in Computer Science, GPA: 3.97/4.0
Full Merit Scholarship

Research Experience

Simula Research Laboratory, Norway and UCSD, San Diego, Simula Summer School
Summer Research Assistant, Advisor: Dr. Andy Edwards — June 2025-August 2025

- Worked with collaborators at UCSD and UCDavis to explore the reconstruction of real pancreatic islets by studying the intrinsic and extrinsic heterogeneity of beta cells in a network.
- Implemented feature and ODE-based sensitivity analyses techniques to determine parameters responsible for intrinsic dynamic behaviors of beta cells.

Rice University, Dept. of Computational Applied Mathematics and Operations Research
Graduate Research Assistant, Advisor: Dr. Matthias Heinkenschloss — May 2023 - May 2025

- Analyzed non-linear parameter estimation problems and collocation methods for differential equations with applications in biophysical neuron models in collaboration with Baylor College of Medicine.
- Developed a Python software to solve parameter estimation problems incorporating post-optimality analysis and automatic differentiation techniques.
- Trained a postdoctoral researcher at Baylor College of Medicine on the use of developed software and mentored three undergraduates by developing a series of presentations on collocation methods.
- Won Outstanding Poster Award out of around 65 posters at SIAM TX-LA conference at Baylor University.

Lebanese American University, Dept. of Computer Science and Mathematics
Undergraduate Research Assistant, Advisor: Dr. Rony Touma — Jan 2021 - August 2021

- Studied numerical methods for differential equations with applications in modeling of Covid-19.
- Participated in the summer undergraduate research and discovery program and completed over 10 research workshops and a five hour Python programming workshop.

Publications

1. *A. Khaddaj, S. Browne, W. Choi, V. Kravets, and A. G. Edwards. Exploring the intrinsic and extrinsic determinants of heterogeneity in a β-cell network. bioRxiv, 2025.* DOI: doi.org/10.1101/2025.10.26.684303
2. *A.Khaddaj. Parameter Estimation of Neuron Models using Subset Selection and Dynamic Optimization By Anwar Khaddaj*, Master's thesis, 2024. Link

Talks and Presentations

1. *Parameter estimation of neuron models using subset selection and dynamic optimization*, Talk at Mathematical biology research seminar at Arizona State University, Oct 3, 2025.

2. *Exploring the intrinsic and extrinsic determinants of heterogeneity in a β-cell network*, Talk at University of California, San Diego, Aug 12, 2025.

3. *Confidence and Degeneracy in Parameter Estimation of Biophysical Neuron Models*, Poster Presentation at Energy HPC 2025 Conference, Feb 25 - 27, 2025.

4. *Parameter estimation of neuron models using subset selection and dynamic optimization*, Invited Talk at graduate research seminar organized by Mathematics Club at Lebanese American University, Feb 18, 2025.

5. *Confidence and Degeneracy in Sequential Parameter Estimation of Biophysical Neuron Models*, Poster Presentation at SIAM TX-LA 2024 Conference, Outstanding Poster Award, Oct 11 - 13, 2024.

6. *Confidence and Degeneracy in Sequential Parameter Estimation of Biophysical Neuron Models*, Poster Presentation at Research Training Group in Numerical Mathematics & Scientific Computing (NASC RTG) Annual Workshop, Oct 4, 2024.

7. *Collocation and Galerkin Time Stepping Methods*, Contributed Talk at NASC RTG Ranch Retreat, Apr 19 - 20, 2024.

8. *An All-At-Once Approach to Parameter Estimation in Neuron Models*, Poster Presentation at SIAM TX-LA 2023 Conference, Nov 3 - 5, 2023.

9. *An All-At-Once Approach to Parameter Estimation in Neuron Models*, Poster Presentation at NASC RTG Annual Workshop, Oct 13, 2023.

Other Projects

1. *URL Shortener Service*, Software Engineering final course project with Dr. Alexei Stolboushkin at Rice University, Fall 2024.

2. *Reduced Order Modeling of the Heat Equation with Diffusion and Advection*, Data Science and Dynamical Systems final course project with Dr. Athanasios C. Antoulas at Rice University, Spring 2024.

3. *Lorenz Equations: Mechanical Analog, Application, and Numerical Experiments*, Senior project with Dr. Leila Issa at Lebanese American University, Spring 2022.

Honors, Certificates, and Awards

Getting Published:Effectively Communicating Your Research, Springer Nature Masterclass Aug 2025
McKinsey.org Forward Program Completion Badge, McKinsey and Company July 2025
Top Graduate Coaching Hours Certificate, Activate Engineering Communication program May 2025
Outstanding Poster Award (65 posters), SIAM TX-LA conference Oct 2024
$100K Global Student Prize Top 50 Finalist (11000 applications, 176 countries), Chegg July 2024
Recognition Award, School of Arts and Sciences, Lebanese American University May 2022
Hackathon Winner, Fouad Makhzoumi Innovation Center, Lebanese American University Feb 2022
Jury's Choice Award, TAQA Youth Well-being Championship, Injaz and UNICEF Lebanon Nov 2022
Hero Mathematics Tutor, MMKN Organization May 2021
Full Merit Scholarship, Lebanese American University Aug 2019
Top 16 National Exams, Lebanese Baccalaureate General Sciences July 2019

Teaching

Teaching Assistant, Arizona State University — Aug 2025 - Present

- MTH 271, Calculus II and Analytical Geometry, Fall 2025

Grader, Rice University — Aug 2022 - May 2025

- CMOR 520, Computational Science, Fall 2024
- CMOR 530, Iterative Methods and Unconstrained Optimization (Qualifying Exam Course), Spring 2024
- CMOR 524, Advanced Numerical Analysis (Qualifying Exam Course), Fall 2023
- CAAM 336, Differential Equations in Science and Engineering, Spring 2023
- CAAM 335, Matrix Analysis, Fall 2022

Teaching Assistant, Lebanese American University — Jan 2022 - May 2022

- MTH 102, Calculus II, Spring 2022

Trainer, Geek Express — Sep 2019 - July 2022

- AI4Climate Hackathon in collaboration with UAE ministry of climate change and environment, July 2022
- MIT App Inventor, Sep 2019 - June 2022

Tutor & Coordinator, MMKN Organization — Sep 2019 - June 2021

- High School Mathematics for students at two public schools

Work Experience

Mentor, LAUInnovate Spark Program — May 2025 - July 2025

- Mentored two startups during their journey in the incubator program at the Lebanese American University's Fouad Makhzoumi Center for Innovation, providing guidance on strategy and pitch development.
- Supported their progression through demo day, helping them secure a spot in the final investment round.

Engineering Coach, Activate Engineering Communication Program, Rice University — Aug 2024 - May 2025

- Coached over 20 Rice undergraduate and graduate engineering students on crafting their design projects, research abstracts, and presentations.
- Reviewed and provided feedback for students on their posters, documentation, and communication skills.

Mentor, Company Program, Injaz Lebanon — Jun 2024 - Sep 2024

The Company Program offers an intensive course for high school and university students helping them learn entrepreneurial skills and start their own venture.

- Supported high school students in refining their innovative STEM-based ideas into viable business ventures.
- Guided a startup through 12 sessions focusing on developing business plans, financial projections, project management and helped them win "Best Social Impact Award" at the national competition hosted by Injaz.
- Coached high school students on public speaking skills preparing them for competitions and public exhibitions.

Outreach Director, Graduate Student Association, Rice University — May 2023 - Aug 2024

- Collaborated with the Office of International Students and Scholars (OISS) to address graduate student issues through two campus-wide programs and coffee chats.
- Directed the International Buddy Program (IBP), leading a team of over 50 volunteers to provide essential support and resources to 350 incoming international graduate students prior graduate orientation.

Co-Founder and CTO, Stoodie — Feb 2022 - Aug 2024

A job shadowing platform helping high school students find their suitable career path by connecting them with professionals.

- Collaborated with a web developer to design job shadowing processes and a front-end tailored to 100+ surveyed students.
- Matched a cohort of eight students with different professionals at an AI education company.
- Received $2K in seed-funding from UNICEF Lebanon and Kingdom of Netherlands, and won Jury's choice award by Injaz Lebanon and LAU hackathon for excellence in business pitch and entrepreneurial strategy.

Leadership and Service

Leadership Team, Nucleate Arizona — Oct 2025 - Present
Ignite Entrepreneurship Trek to Silicon Valley Participant, Rice Alliance — Mar 12 - 15, 2025
Treasurer, Rice SIAM Chapter — Sep 2023 - Aug 2024
Graduate Panelist, Rice University Gulf Coast Undergraduate Research Symposium — Nov 2023
International Buddy Program Leader, Rice Office of International Students — May 2023 - Aug 2023
Speaking Coach, TEDxRice — Sep 2022 - Dec 2022
Diversity Seminar Organizer, Rice CMOR Grad Seminar — Nov 2022
President, Mathematics Club at Lebanese American University — Sep 2021 - May 2022

Skills and Languages

Programming Languages:, Python, MATLAB, Java, C++ (OpenMP, MPI, CUDA), Julia.
Python Libraries: NumPy, SciPy, Matplotlib, Pandas, JAX, Scikit-Learn, TensorFlow, Keras.
Software: Git, IPOPT, Pyomo, Bash, LaTeX.
Languages: Bilingual - Fluent in English and Arabic; Basic in German and French.