

Mohsen Aliabadi

RESEARCH AREAS OF INTEREST	<ul style="list-style-type: none">◇ Combinatorics◇ Additive Number Theory◇ Field Theory and Polynomials◇ Linear and Multilinear Algebra◇ Probability and Statistics◇ Mathematical Foundation of Artificial Intelligence
EMPLOYMENT	<ul style="list-style-type: none">◇ University of California, San Diego, Stephen E. Warschawski Assistant Professor, 2022-2025◇ Outlier, AI Research Scientist, Summer 2024◇ Iowa State University, PostDoc Research Associate, 2020-2022◇ University of Illinois at Chicago, Instructor, 2019- 2020◇ University of Illinois at Chicago, Teaching Assistant, 2014- 2019◇ Sharif University of Technology, Teaching Assistant, 2010- 2011
EDUCATION	<ul style="list-style-type: none">◇ University of Illinois at Chicago, 2020 Ph.D. in Pure Mathematics Thesis: Matchings in Groups and Vector Spaces Advisor: Shmuel Friedland◇ Rochester Institute of Technology, Rochester, NY, 2013 Visiting Student◇ Sharif University of Technology, Tehran, Iran, 2012 M.Sc. in Pure Mathematics (with distinction) Thesis: Matchings in Groups Advisor: Saieed Akbari
AWARDS, FUNDS AND HONORS	<ul style="list-style-type: none">◇ Travel Award, Institute for Pure and Applied Mathematics, Optimal Transport for Density Operators: Theory and Numerics, UCLA, 2025 (in the amount of \$ 1800.00)◇ NSF Mathematical Foundation of AI grant (2024, Co-PI, not received) Proposal: Automated Theorem Proving Using LLM.◇ Undergraduate Summer Research Funding, UCSD, 2024 (in the amount of \$ 7500.00)◇ Postdoctoral Scholar Research Excellence Award, Iowa State University, 2022◇ Postdoctoral Scholar Excellence Award for Teaching and Mentoring Students, Iowa State University, 2021◇ Dean's High Impact Fund for summer research ,ISMaRT, 2021 in the amount of \$ 9,600.00◇ SIAM Early Career Travel Grant, 2021◇ MSCS Teaching Assistant Award, University of Illinois at Chicago, Spring 2018◇ Ranked 3rd in cumulative GPA among pure mathematics M.Sc. students class of 2009, Mathematics Department, Sharif University of Technology, 2012◇ Travel Award, Erdős Memorial Lecture Series, 2019◇ Travel Award, Triangle Lectures in Combinatorics, North Carolina State University, 2019◇ Travel Award, the 30th International Conference on Algebraic Combinatorics, Dartmouth College, 2018◇ Travel Award, Linear Algebra Workshop, Washington State University, 2018◇ Travel Award, the University of Illinois at Chicago, Graduate College, 2018

- ◇ Travel Award, 31st Midwestern Conference on Combinatorics and Combinatorial Computing, University of West Georgia, 2017
- ◇ Travel Award, International Linear Algebra Society, Iowa State University, 2017
- ◇ Travel Award, Graduate Students Combinatorics Conference, University of Kansas, 2017
- ◇ Research Assistant award with Shmuel Friedland, UIC, Spring 2016
- ◇ Travel Award, Institute for Mathematics and its Applications, University of Minnesota, 2014
- ◇ Graduate Merit Scholarship, Rochester Institute of Technology, Rochester, NY, 2013

PUBLICATIONS **Published:**

- ◇ **The weak acyclic matching property in abelian groups**, (with P. Taylor), To appear in [Séminaire Lotharingien de Combinatoire](https://arxiv.org/abs/2404.02178) <https://arxiv.org/abs/2404.02178>
- ◇ **Matchings in matroids over abelian groups II**, (with R. Y. Wu, S. Yermolenko), To appear in [Discrete Mathematics, Algorithms and Applications](https://arxiv.org/abs/2412.04516). <https://arxiv.org/abs/2412.04516>
- ◇ Classifying abelian groups through acyclic matchings, (with P. Taylor), To appear in [Annals of Combinatorics](https://arxiv.org/abs/2402.08008)) <https://arxiv.org/abs/2402.08008>
- ◇ Conditions for matchability in groups and field extensions II, ([Discussiones Mathematicae - General Algebra and Applications](#) 45(1) (2025) 135-157
- ◇ Matchings in matroids over abelian groups, (with S. Zerbib), [J. Algebraic. Combinatorics](#), (2024) 59:761–785
- ◇ Conditions for matchability in groups and field extensions, (with J. Kineth, C. Kunz, H. Serdarevic, C. Willis) [Linear and Multilinear Algebra](#), (2023), no. 7, 1182–1197.
- ◇ Results and open problems on matchings in abelian groups and vector subspaces in fields, (with K. Filom) [Journal of Algebra](#), 598 (2022) 85–104.
- ◇ On the complexity of finding tensor ranks, (with Sh. Friedland), [Commun. Appl. Math. Comput.](#) 3 (2021), no. 2, 281–289.
- ◇ On matchable subsets in abelian groups and their linear analogues, (with M. V. Janardhanan), [Linear Algebra Appl.](#) 582(2019), 138-155.
- ◇ A note on the fundamental theorem of algebra, [Bull. Austral. Math. Soc.](#) 97 (2018), no. 3, 382-385.
- ◇ On local matching property in groups and vector spaces (with M.V. Janardhanan), [Australasian Journal of Combinatorics](#). Vol 70(1) (2018), 75–85.
- ◇ Acyclicity for groups and vector spaces (with H. Jolany, M.A. Khajenejad, M.J. Moghadamzadeh, H. Shahmohamad), [Asian Bulletin of Mathematics](#). Vol. 41(6) (2017), 797–805.
- ◇ Cancelable numbers (with E. Nategh and H. Shahmohamad), [J. Combin. Math. Combin. Comput.](#) 102 (2017), 45–54.
- ◇ On matching in groups and vector spaces (with A. Jafari and M. Hadian), [Journal of Algebra and its Applications](#). Vol. 15, No. 1 (2016) 1650011.
- ◇ On maximal and minimal linear matching property (with M.R. Darafsheh), [Algebra and Discrete Mathematics](#). Vol. 15, Number 2 (2013), pp. 174–178.
- ◇ A note on multi Poly-Euler numbers and Bernoulli polynomials (with H. Jolany, R.B. Corcino and M.R. Darafsheh), [General Mathematics](#). Vol. 20, No. 2-3 (2012), 122–134.

Submitted, Preprint:

- ◇ **Characterization of matchable sets and subspaces via Dyson transforms**, (with J. Losonczy), <https://arxiv.org/abs/2507.10937>, submitted (2025)
- ◇ **Matchings in matroids over abelian groups III**, (with E. Krop), preprint (2025)
- ◇ **Erratum to: matching subspaces in a field extension**, (with S. Akbari), <https://arxiv.org/abs/1507.06983>, preprint (2014)

In Preparation:

- ◇ **Structure theorems for unmatchable sets and their linear analogues**, (with J. Losonczy).

- ◇ **On partial matchings in groups and vector spaces**, (with J. Losonczy).
- ◇ **Additive theorems in abelian groups and their linear extensions**.
- ◇ **A graph theoretical interpretation of a covering result in metric spaces**, (with B. Esmayli).
- ◇ **On analog of the van der Waerden conjecture on hanians**, (with Sh. Friedland).
- ◇ **The fundamental theorem of algebra; minimal algebra and analysis**

BOOKS

- ◇ **Linear algebra and matrices** (with Sh. Friedland), Book~300 pages, Society for Industrial and Applied Mathematics (SIAM), Philadelphia, PA, 2018.
- ◇ **Probability and analysis on graphs** (with Sh. Friedland), Book~250 pages, De Gruyter, 2025.

TALKS

Colloquium Talks

- ◇ **Minimal algebra of the finfamental theorem of algebra**, Departmental Colloquium, Fayetteville State University, North Carolina, 2025.
- ◇ **Axiomatization of algebraically closed fields: The optimal approach**, Departmental Colloquium, University of Las Vegas, Reno, 2024.
- ◇ **Prime number axiom and the fundamental theorem of algebra**, Undergraduate Colloquium, University of California, San Diego, CA, 2024.
- ◇ **Fundamental theorem of algebra, improved**, Departmental Colloquium, California State University, Northridge, CA, 2024.
- ◇ **Degree axioms and the fundamental theorem of algebra**, Departmental Colloquium, College of Charleston, Charleston, South Carolina, 2024.
- ◇ **Tensor ranks and their computational complexity**, Departmental Colloquium, Georgetown University, Washington D.C., 2023.

Invited Talks

- ◇ **Abelian additive theory and its linear analogues**. LAS Special Session on Matrix Analysis and Applications, Washington D.C., 2026
- ◇ **Degree axioms of the fundamental theorem of algebra**. Clayton State University, departmental seminar, Morrow, GA, 2025.
- ◇ **An application of an efective Hilbert Nullstellensatz**. Computer Science and Engineering Theory Seminar, UCSD, San Diego, CA, 2025.
- ◇ **Complexity of finding tensor ranks**. ILAS Special Session on Matrix Analysis and Applications, Seattle, WA, 2025.
- ◇ **Recent developments about tensor ranks**. SIAM Conference on Applied Linear Algebra, Sorbonne University, Paris, France, 2024.
- ◇ **Recent developments on the fundamental theorem of algebra** Combinatorics, Algebra and Geometry Seminar (CAGS), George Mason University, Fairfax, VA, 2023.
- ◇ **Tensor ranks**. 25th Conference of the International Linear Algebra Society, Madrid, Spain, 2023.
- ◇ **Complexity of finding tensor ranks**. University of California-San Diego, CA, 2023.
- ◇ **Matrices were created by God, Tensors by the Devil**. JMM-LAS special session “Matrices and Operators”, Boston, 2023.
- ◇ **Complexity of finding tensor ranks** University of California-San Diego, CA, 2022.
- ◇ **Matching matrices and the primitive subspace theorem**, JMM-LAS special session “Matrix Analysis and Applications”, Seattle, 2022.
- ◇ **Applications of Kneser’s additive theorem**, Upstate Number Theory Conference, Union College in Schenectady, NY, 2021.
- ◇ **Applications of combinatorial number Theory in classifying abelian groups**, University of Lethbridge, Alberta, Canada, 2021.
- ◇ **Matching matrices and the primitive subspace theorem**, SIAM conferences on linear algebra, New Orleans, Louisiana, 2021.

- ◇ **Matching matrices**, UNR matrix seminar, University of Nevada, 2020.
- ◇ **Spectral norm of a symmetric tensor and its computation**, AMS special session on Tensors and Complexity, University of Virginia in Charlottesville, Virginia, 2020.

Contributed Talks

- ◇ **Acyclic matchings**, International Conference on Enumerative Combinatorics and Applications, University of Haifa, Israel, 2025.
- ◇ **Classifying all abelian groups through acyclic matchings**, INTEGERS conference, University of Georgia, Athens, GA, (honoring the 80th birthdays of Melvyn Nathanson and Carl Pomerance), 2025.
- ◇ **Minimal algebra of the fundamental theorem of algebra**, AMS Contributed Paper Session, History, biography, logic and foundations, Seattle, 2025.
- ◇ **Matching matroids over abelian groups**, International Conference on Enumerative Combinatorics and Applications, University of Haifa, Israel, 2024 .
- ◇ **Minimal algebra of algebraically closed fields**, University of California, San Diego, Math Seminar, 2024.
- ◇ **Acyclic matchings**, Maine-Quebec Number Theory Conference, University of Maine, 2023.
- ◇ **Matching matroids over abelian groups**, Iowa State University, Discrete Math seminar, 2022.
- ◇ **Matchings in groups and field extensions**, University of Illinois at Chicago, 2020
- ◇ **A connection between matchings in field extensions and the fundamental theorem of algebra**, Fall western sectional meeting, Riverside, California, 2019.
- ◇ **Matchings in groups and their linear analogues**, 2019 Erdős Memorial Lecture Series, University of Memphis.
- ◇ **On linear matching property in vector spaces**. Linear Algebra Workshop, 2018, Washington State University.
- ◇ **On acyclic matching property in groups and vector spaces**. 31st Midwestern Conference on Combinatorics and Combinatorial Computing, 2017, University of West Georgia.
- ◇ **On matchings in groups and vector spaces**. International Linear Algebra Society, 2017, Iowa State University.
- ◇ **Matching subspaces in a field extension**, University of Illinois at Chicago, 2017.
- ◇ **On matchings in groups and vector spaces**. Graduate Students Combinatorics Conference, 2017, University of Kansas, Lawrence, Kansas.
- ◇ **On local matchability in groups and vector spaces**. 29th Midwest Conference on Combinatorics and Combinatorial Computing, 2015, College of Charleston, Charleston, SC.
- ◇ **On matchable subsets in abelian groups and their linear analogues**, 33rd MCCCC, Rochester Institute of Technology, 2019.
- ◇ **On a linear version of Hall's Marriage Theorem**, Students Seminar, Sharif University of Technology, Tehran, Iran, 2013.
- ◇ **Recent developments of matchings in groups**. Iranian Conference on Algebraic Combinatorics, 2011, Hamedan, Iran.

- CONFERENCES ORGANIZED
- ◇ **Organizer, JMM-LAS special session “Matrix Analysis and Applications”**, Washington, D.C., January 2026. (Together with Tin Yau Tam and Xiang Xiang Wang)
 - ◇ **Organizer, JMM-LAS special session “Matrix Analysis and Applications”**, Seattle, January 2025. (Together with Tin Yau Tam and Luyining Gan)
 - ◇ **Organizer, JMM-LAS special session “Matrices and Operators”**, Boston, January 2023. (Together with Tin Yau Tam and Pan Shun Lau)

- ◇ **Organizer, JMM-LAS special session “Matrix Analysis and Applications”**, Seattle, April 2022.
(Together with Tin Yau Tam and Luyining Gan)

EDITORIAL ◇ Editor of **The Bulletin of the International Linear Algebra Society, IMAGE** (July 2023-present)

REFERRING AND REVIEWING ◇ Journal of Combinatorial Theory, Series A (1 paper)
 ◇ Journal of Algebra (1 paper)
 ◇ Rendiconti del Circolo Matematico di Palermo Series 2 (1 paper)
 ◇ Asian Journal of Mathematics (1 paper)
 ◇ Linear Algebra and its Applications(1 paper)
 ◇ Wiley (1 book)
 ◇ SIAM (1 book)
 ◇ Bulletin of the International Linear Algebra Society, IMAGE(1 book)
 ◇ The Electronic Journal of Linear Algebra(2 papers)
 ◇ SEABM (1 paper)
 ◇ Journal of Algebra and its Applications (1 paper)
 ◇ Journal of Advances in Mathematics and Computer Science (1 paper)
 ◇ Linear and Multilinear Algebra (1 paper)
 ◇ Discrete Mathematics (1 paper)
 ◇ Reviewer for MathSciNet
 ◇ Judge for 10th Annual Graduate and Professional Student Conference (GPSC) 2022

ADVISING ◇ **UCSD, 2024 Undergraduate Summer Research (SRP)** , 2024.
 (In this program, students collaborate on a research project and are supervised by a faculty member three times per week for ten weeks. This project has been awarded the 2024 Undergraduate Summer Research Award in the amount of \$7500.00)
 ◇ **UCSD Enrichment program**, 2023
 This provides academic credit for work experience with public/private sector employers, UCSD, 2024. We meet with an undergraduate student every week to coach them in teaching high school-level mathematics. Each week, the undergraduate student meets with high school students and prepares them for higher-level mathematics.)
 ◇ **Postdoc mentor for the Graduate Research Workshop in Combinatorics (GRWC)**, 2021.
 (GRWC is an annual two-week collaborative research workshop for advanced graduate students and post-docs from all areas of combinatorics. All participants submit an open problem in combinatorics. These problems form the basis of the collaborative research undertaken at the workshop. One-on-one mentoring with accepted participants to help them refine their submissions. Each mentor (Postdocs and faculties) will work to ensure that proposed problems strike the appropriate balance of depth and accessibility.)
 ◇ **Iowa State Mathematics Research Teams (ISMaRT)**, 2021
 (ISMaRT engages ISU undergraduate students in mathematical research in teams. Each team of 2-4 undergraduates is led by a postdoctoral research associate and also contains a faculty member. Our ISMaRT group led by Prof. Shira Zerbib and I, won Dean’s High Impact Award for summer, 2021 in the amount of \$ 9,600.00.)

Undergraduate Students:

1. Yujia Wu, Undergraduate Student, UCSD, 2024.(recipient of UCSD Physical Sciences Dean’s Undergraduate Award for Excellence, 2025)

2. Sophia Yermolenko, Undergraduate Student, UCSD, 2024.(recipient of UCSD Undergraduate Research Award, 2024)
3. Sarah Yu, Undergraduate Student, UCSD, 2024.
4. Haris Serdarevic, Undergraduate Student, ISU, 2021.(Subsequently PhD student at University of Arizona)
5. Cole Willis, Undergraduate Student, ISU, 2021(Subsequently PhD student at University of Minnesota)
6. Jack Kinset, Undergraduate Student, ISU, 2021.(Subsequently PhD student at George Mason University)
7. Christopher Kunz, Undergraduate Student, ISU, 2021.(Subsequently M.Sc. student at Iowa State University)

Undergraduate Research Paper:

- ◇ **Matchings in matroids over abelian groups II**, (with R. Y. Wu, S. Yermolenko), To appear in Discrete Mathematics, Algorithms and Applications.
(This paper was presented by the undergraduate coauthors in the PME Contributed Session on Research by Undergraduates at the 2025 Joint Mathematics Meeting)
- ◇ **Conditions for matchability in groups and field extensions**, (with ISMaRT group), Linear and Multilinear Algebra, (2023), no. 7, 1182–1197.

TEACHING

CSU teaching:

- ◇ Fall 2025, Calculus II.
- ◇ Fall 2025, Calculus III.

UCSD teaching:

- ◇ Summer 2025, Math 109, Mathematical Reasoning (Large lecture, ~ 120 students.)
- ◇ Summer 2025, Math 103, Abstract Algebra (Large lecture, ~ 240 students.)
- ◇ Spring 2025, Math 102, Applied Linear Algebra (Large lecture, ~ 280 students.)
- ◇ Winter 2025, Math 4C, Precalculus (~ 80 students.)
- ◇ Fall 2024, Math 11, Introduction to Probability and Statistics (Large lecture, ~ 400 students.)
- ◇ Summer 2024, CSE 6R, Introduction to Computer Science and Object-Oriented Programming: Python (~ 40 students.)
- ◇ Summer 2024, Topics in Combinatorics (with a focus on Matroid Theory)
- ◇ Summer 2024, Math 103A, Abstract Algebra (Large lecture, ~ 120 students.)
- ◇ Spring 2024, Math 154, Discrete Mathematics and Graph Theory (Large lecture, ~ 180 students.)
- ◇ Winter 2024, Math 103B, Modern Algebra II (Large lecture, ~ 100 students.)
- ◇ Fall 2023, Math 4C, Precalculus
- ◇ Summer 2023, Math 103A, Modern Algebra I (Large lecture, ~ 140 students.)
- ◇ Spring 2023, Math 166, Math 154, Discrete Mathematics and Graph Theory (Large lecture, ~ 100 students)
- ◇ Winter 2023, Math 109, Mathematical Reasoning (Large lecture, ~ 150 students.)
- ◇ Fall 2022, Math 3C, Precalculus, (Large lecture ~ 150 students)
- ◇ Summer 2022, Math 4C, Precalculus
- ◇ Summer 2022, Math 170A, Introduction to Numerical Analysis (Large lecture, ~ 170 students.)

ISU teaching:

- ◇ Spring 2022, Math 151, Calculus for Business. Large lecture ~ 150 students
- ◇ Fall 2021, Math 165, Single variable calculus, first part
- ◇ Spring 2021, Math 166, Single variable calculus, second part
- ◇ Fall 2020, Math 301, Abstract algebra

UIC teaching as Lecturer:

- ◇ Spring 2020, Math 194, Special topics in mathematics
- ◇ Spring 2020, Math 182, Emerging scholars workshop for calculus (The Emerging Scholars Program (ESP) offers an opportunity to work on challenging mathematics problems with classmates through innovative techniques of cooperative learning.)
- ◇ Fall 2019, Math 125, Linear algebra for business
- ◇ Summer 2019, Math 090, Summer Enrichment Workshop
- ◇ Spring 2019, Math 220, Introduction to differential equations

UIC teaching as Teaching Assistant:

- ◇ Fall 2018, Math 125, Linear algebra for business
- ◇ Summer 2018, Math 090, Summer Enrichment Workshop
- ◇ Spring 2018, Math 181, Multi-variable calculus
- ◇ Fall 2017, MCS 423, Graph theory
- ◇ Summer 2017, Math 180, Single variable calculus
- ◇ Spring 2017, MCS 521, Combinatorial Optimization
- ◇ Fall 2016, Math 410, Advanced calculus
- ◇ Spring 2016, Math 425, Advanced linear algebra
- ◇ Fall 2015, Math 125, Linear algebra for business
- ◇ Summer 2015, Math 090, Summer Enrichment Workshop
- ◇ Spring 2015, MATH 122, Emerging scholars workshop for Precalculus (intensive math workshop for students enrolled in Precalculus.)
- ◇ Fall 2014, STAT 101, Introduction to statistics
- ◇ Fall 2014, STAT 130, Introduction to Statistics for the Life Sciences
- ◇ Summer 2014, Math 180, Single variable calculus
- ◇ Spring 2014, Math 118, Mathematical Reasoning

RIT teaching as Teaching Assistant:

- ◇ Fall 2013, Math 111, Calculus I

SUT teaching as Teaching Assistant:

- ◇ Fall 2011, Linear algebra
- ◇ Summer 2011, Advanced algebra for Masters students
- ◇ Spring 2011, Abstract algebra
- ◇ Fall 2010, Math 090, Elementary number theory

LANGUAGES

Azeri (native)
Farsi (native)
English (fluent)
Turkish (intermediate)
Arabic (basic)

TECHNICAL
SKILLS

Mathematical Software: Macaulay2, MATLAB, Minitab
Document Preparation: LaTeX