

Math/CS Chatter

Summer 2024 — Volume 4

TEAM EFFORT

CS Students Modernize 84 Lumber's Tech Infrastructure

Last year, a group of students engaged in a research and consulting project with 84 Lumber, a building supply company based in western Pennsylvania. This company employs approximately 5,000 individuals and has annual revenues of \$4 billion.

This collaboration was made possible by **Paul Yater '94**, a dedicated Dickinson alumnus and the Chief Technology Officer at 84 Lumber.

Led by **Professor John MacCormick**, the Dickinson team tackled several initiatives, including translating legacy systems code into a modern software framework and exploring how recent AI tools can enhance 84 Lumber's business processes.

The photo shows the team, including computer science majors **Boosung Kim '25**, **William Cheng '24**, **Pranav Mishra '25**, **Youssif Goda '26**, **Shahir**

Ahmed '25, **Shaikh Ibrahim Rahman '26**, **Fox Becker '26**, **John Chu '24**, and **Maximo Sanchez '26**, after a recent project meeting.

Huge thanks to Paul Yater for making this project possible, and kudos to the students who are dedicating their time to the project.



NEW DEPARTMENT MEMBERS IN 2024

Mathematics and Computer Science



MELISSA INNERST

Assistant Professor of Mathematics and Data Analytics

Professor Melissa Innerst joined the department as a new Assistant Professor of Mathematics and Data Analytics. Melissa is an applied statistician with broad research interests including spatial statistics and time series analysis, often from a Bayesian perspective. Some of her recent interdisciplinary collaborations include an analysis of the effect of global warming on the reproductive cycles of freshwater turtles, fault detection in wastewater treatment plants, rainfall area classification, and an analysis of LMS clickstream data. She is also an active member of multiple professional organizations focused on statistics and data science education.



MATTHEW FERLAND

Assistant Professor of Computer Science

Professor Matthew Ferland joined the department as a new Assistant Professor of Computer Science. Matt's research interests are primarily in "fun" problems relating to computer science theory, and in computer science education. His theoretical research involves things like computation of combinatorial game theoretical values and identifying algorithms and computational complexity for a variety of games and puzzles. In CS Education, his interests are broad, but some in particular are alternative grading schemes, effective classroom interventions, and increasing inclusivity and participation. He also holds an interest in the history of computing, especially in programming languages and semiconductor manufacturing.

CONGRATULATIONS GRADUATES!

Class of 2024

This year we graduated 21 Computer Science majors and 21 Mathematics majors at the May 19th commencement.

Graduate school plans for the class of 2024 include:

- Ph.D. in Computer Science at Columbia University
- Ph.D. in Mathematics at the University of Nebraska Lincoln.
- Ph.D. in Computer Science at Ohio State University.
- M.A. in Strategy, Cybersecurity, and Intelligence at Johns Hopkins SAIS
- M.S. in Cybersecurity University of Maryland Baltimore County
- M.S. in Quantitative Finance at University of Maryland
- Ph.D. in Computer Science at the University of North Carolina at Chapel Hill

Employment for the class of 2024 includes:

- Software Engineer at Google
- Software Engineer at Atlassian
- Software Engineer at Enterprise Knowledge



DEPARTMENTAL HONORS

Three Seniors Successfully Defend Thesis

Emily Shambaugh '24

"Factorization Patterns of Polynomials and Partitions"

Advisor: **Professor Holley Friedlander**

Dzung Dinh '24

"Volume Estimation via Neural Radiance Field 3D Reconstruction Algorithms"

Advisor: **Professor John MacCormick**

Hailie Mitchell '24

"Adversarial Rendering for Grasp Quality Convolutional Neural Networks"

Advisor: **Professor John MacCormick**



STUDENT KUDOS

Selected Highlights

Mathematics and Russian double major **Peter Guma '24** won a Fullbright English Teach Award and is teaching in Uzbekistan this year.



Emily Shambaugh '24 and **Noah Lape '26** teamed up with friends from Ursinus College to win Math Jeopardy at the Eastern Pennsylvania and Delaware section meeting of the Mathematical Association of America.

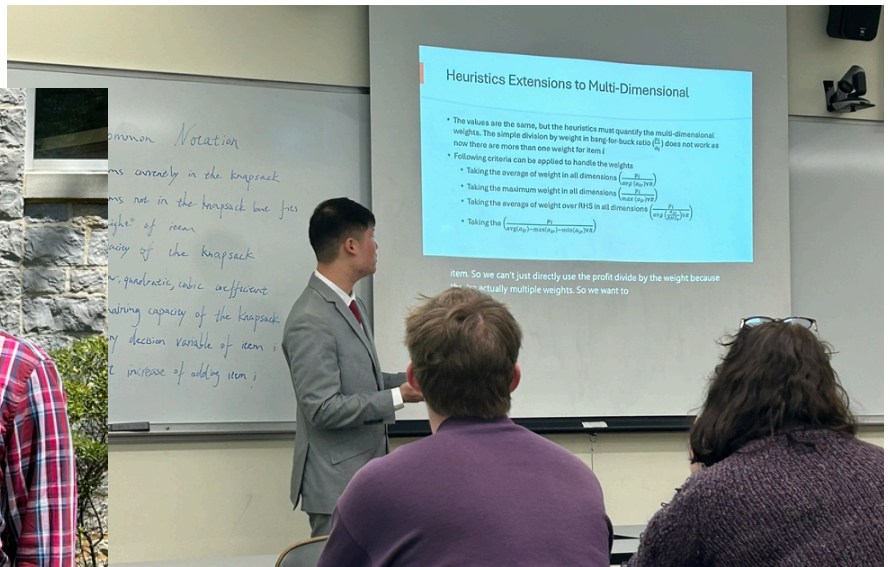
Dzung Dinh '24 had a research paper accepted for presentation at the leading artificial intelligence conference NeurIPS 2023. The paper will also be published in the conference proceedings. The title of the paper is "The Grand Illusion: The Myth of Software Portability and Implications for ML Progress." This work is co-authored with collaborators from the nonprofit organization Cohere for AI and a professor from MIT.

A four-person team featuring computer science majors **Boosung Kim '25** and **Marcel Lee '24** won first-place award in two categories of the PennApps Hackathon hosted by the University of Pennsylvania. Competing with 113 other teams, they created Frody, a distributed real-time credit card fraud detection service with Google Cloud, machine learning, dbt Labs, Twilio API, and React. The team received prizes in "Best Distributed Systems Hack" (placed first out of 15 teams in this track) and "Most Technically Complex Hack" (placed first out of 51 teams in this track). Also on their team were a student from Louisiana State University and one from the University of Pittsburgh.

STUDENT KUDOS

Selected highlights

Mathematics and computer science major **Quang Phung '26** won the 2023 Dickinson Concerto Competition! Quang gave an exciting performance of the first movement to Greig's Piano Concerto in A Minor, Op 16 and was the featured soloist in spring 2024 with the Dickinson Orchestra.



William Cheng '24 gave the presentation "Greedy Heuristics Evaluation for Cubic Multidimensional Knapsack Problem" on his work with Professor Dick Forrester.

Hemanth Kapa '27 received a grant from the Emergent Ventures program of the Mercatus Center at George Mason University. The grant will support Hemanth's research employing machine learning to analyze biological aging processes.

BUILDING SUCCESS

2024 Departmental Prizes and Awards

THE JANE HILL PRIZE IN COMPUTER SCIENCE

Awarded to that member of the freshman class who excels in computer science

Hillary Zhong '27

THE WILLIAM W. LANDIS MEMORIAL PRIZE IN MATHEMATICS

Endowed by George G. Landis '20. Awarded to a member of the freshman class

Mariana Kushnir '27

THE HENRY P. CANNON MEMORIAL PRIZE IN MATHEMATICS

Endowed by the trustees. Awarded to a member of the sophomore class who excels in mathematics

Victor Heinze '26

THE FORREST E. CRAVER MEMORIAL PRIZE IN MATHEMATICS

Awarded to a member of the junior class

Megan Triplett '25

THE LANCE E. KOHLHAAS MEMORIAL PRIZE IN MATHEMATICS

Awarded to a graduating mathematics major who has demonstrated excellence in that field and shows promise in an actuarial or mathematics career. Endowed by the friends and family of Lance E. Kohlhaas, class of 1986

Emily Ochlis '24

THE RICHARD HOWLAND PRIZE IN MATHEMATICS AND COMPUTER SCIENCE

Awarded to a senior for excellence in mathematics or computer science

Hailie Mitchell '24

THE CAROLINE HATTON CLARK MATHEMATICS SCHOLARSHIP

Awarded for outstanding achievement in mathematics

Allison Smith '25

THE RICHARD HOWLAND MEMORIAL SCHOLARSHIP

Endowed through gifts and a bequest from the estate of Kenneth Howland in memory of his son, Richard Howland, former faculty member at Dickinson College

Boosung Kim '25





FACULTY KUDOS

Selected Highlights

Professor Dick Forrester coauthored the paper “The First-Year Seminar Assignment Problem: A Multi-Objective Optimization Approach” with **John Chu ‘24**, which is currently under review at the *UMAP Journal*. After three years of leading the Department of Data Analytics as chair, he will be stepping down to go on sabbatical.

Professor Tracy McKay worked with **Jackie Campbell** to organize a Community in STEM(+) networking lunch for STEM and otherwise quantitatively connected faculty and staff at Dickinson. She attended the WinCom (Women in Combinatorics) virtual conference.

Professor Jennifer Schaefer coauthored the paper “Fixed-Group Conjugacy Classes of Unipotent Elements in Low-Dimensional Symmetric Spaces of Special Linear Groups over a Finite Field,” which was accepted by the *Journal of Algebra and Its Applications*. She coauthored “Tips for Saving Time Grading”

for the *Notices of the American Mathematical Society*. She received a \$20,000 NSF Conference Grant for the conference “Research, Mentorship, and Community for Current and Future Underrepresented Algebraists.”

Professor Melissa Innerst organized and moderated the contributed paper session “Community-Focused Activities in the Statistics and Data Science Classroom” at MathFest 2024. She graded AP Statistics exams for the sixth year in a row.

Professor Holley Friedlander coauthored the paper “Posters Projects in an Introductory Abstract Algebra Course” with **Professor Jennifer Schaefer**, which will appear in *PRIMUS*. She authored the paper “Twisted Weyl group multiple Dirichlet series over the rational function field” that was published in *Journal of Number Theory*.

FACULTY KUDOS

Selected Highlights

Professor Dave Richeson spoke at a classical studies conference about his work in the history of mathematics. He organized an invited paper session on math and art at MathFest 2024 where he also gave the Martin Gardner invited lecture.

Professor Naderi Dehkordi received an Inclusive Pedagogy Grant for “Enhancing Equity and Inclusion in Data Mining Education,” an initiative that focuses on making data mining more accessible and equitable for all students; a 2024 Summer Think Tank Mini-Grant from the Center for the Futures of Native People, aimed at

integrating Indigenous perspectives into technology and data science education; and a follow-on grant to develop a Course Syllabus for “Data Mining and Ethical Dialogues,” emphasizing ethical issues in data science education.

Professor Farhan Siddiqui authored the paper “Enabling TCP Communication over Terahertz Links: An Extension to ns-3’s TeraSim Module,” which appeared in the *Proceedings of the 3rd ACM SIGCOMM Workshop on 5G and Beyond Network Measurements, Modeling, and Use Cases*.

PROMOTION NEWS

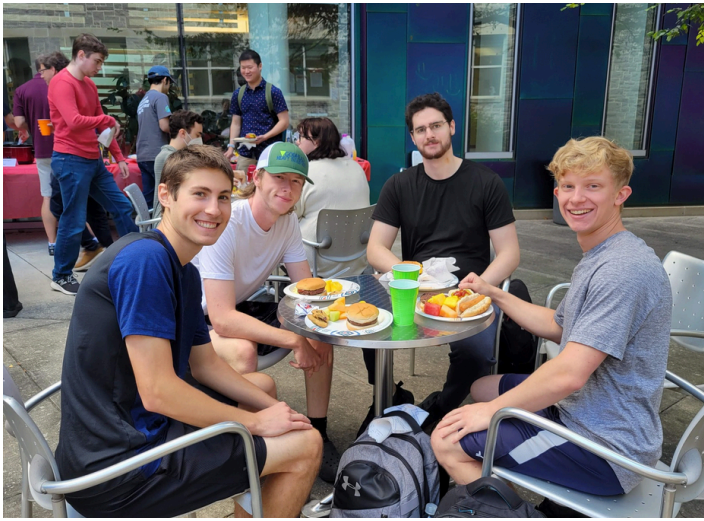
Professor Friedlander Receives Tenure

Congratulations to **Professor Holley Friedlander** for receiving tenure and being promoted to Associate Professor of Mathematics!



MATH/CS MEMORIES

Photos from the 2023–24 Academic Year



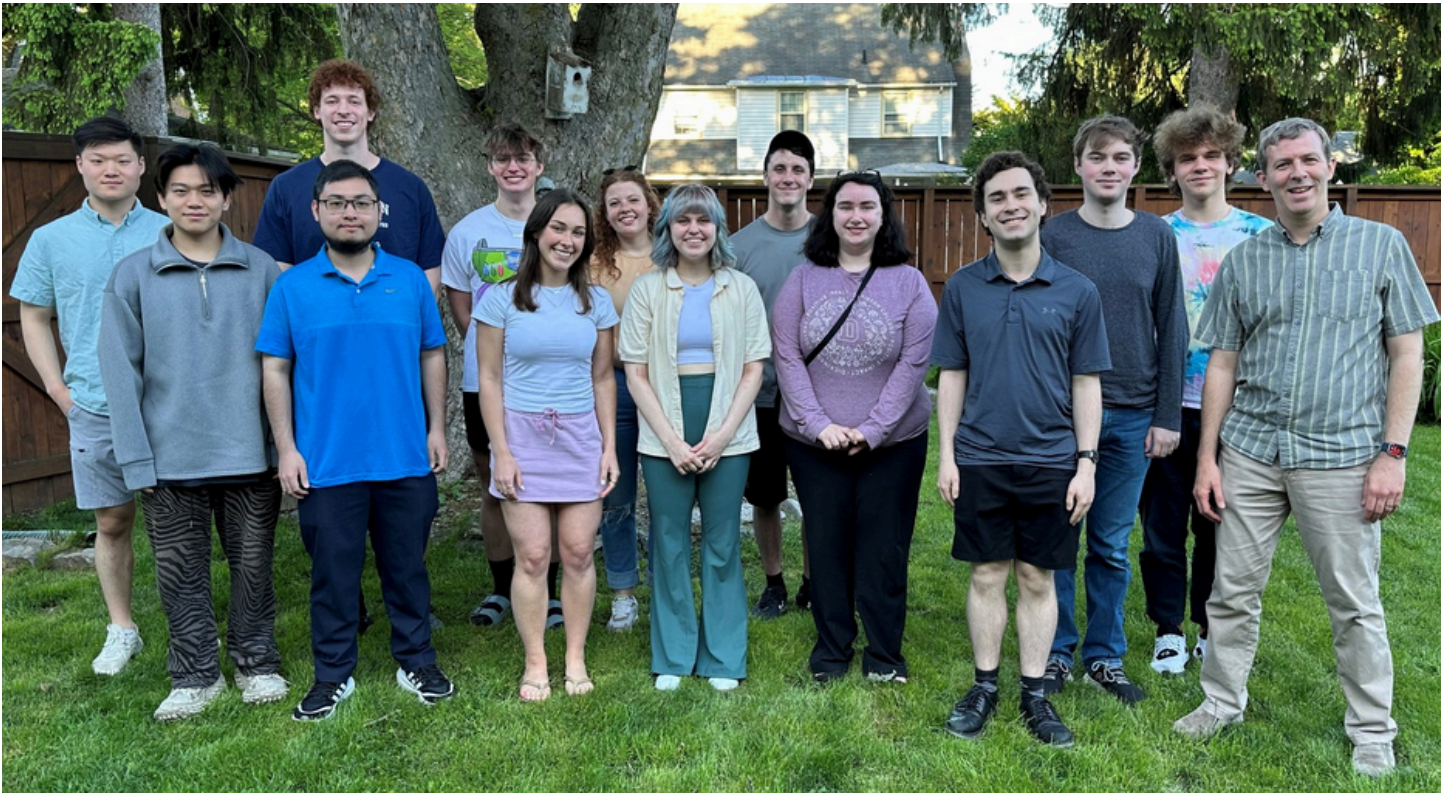
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Photos from the 2023–24 Academic Year



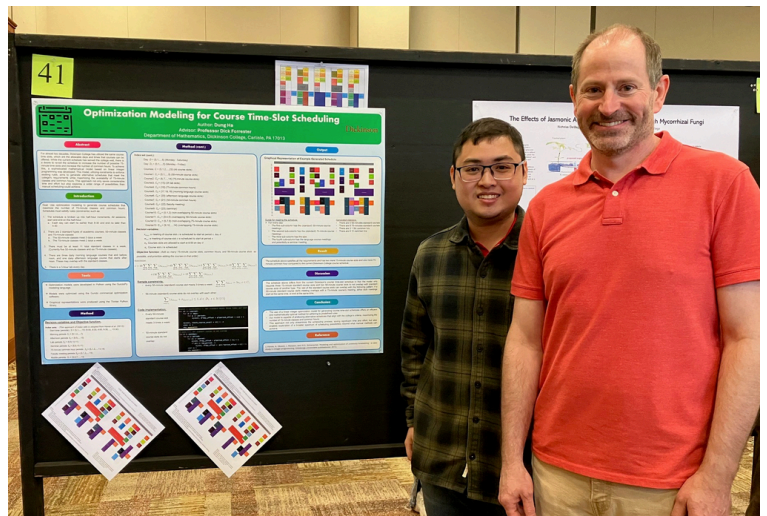
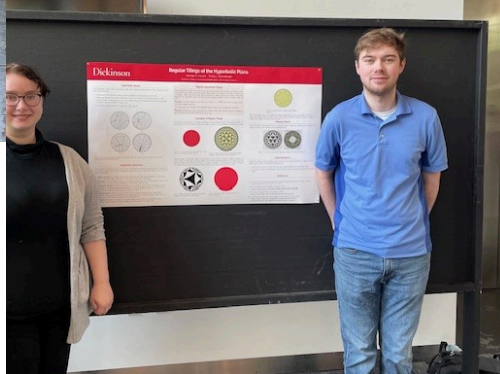
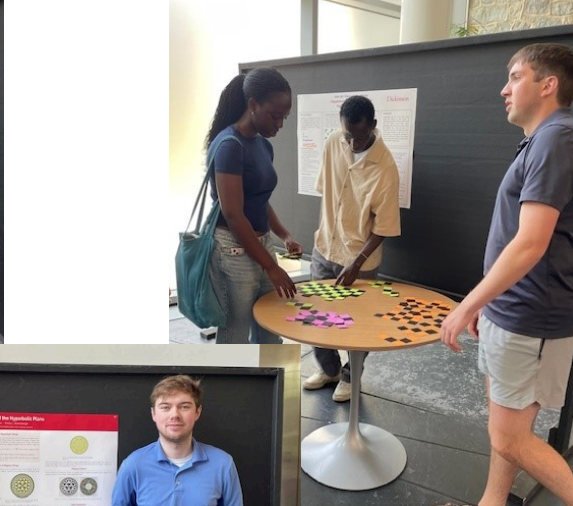
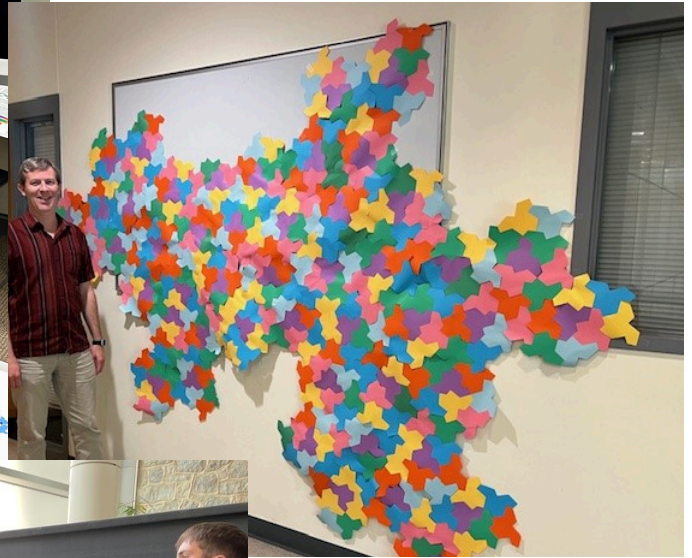
MATH/CS MEMORIES

Photos from the 2023–24 Academic Year



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Photos from the 2023–24 Academic Year



THE PROBLEM CORNER

Math, Logic, and Other Puzzles

1. Logic Puzzle: The Truth-tellers and Liars

Three students, Alice, Bob, and Carol, are either truth-tellers (they always tell the truth) or liars (they always lie). You ask them the following questions:

- Alice says, "Bob is a liar."
- Bob says, "Carol is a liar."
- Carol says, "Alice and Bob are both liars."

Who are the truth-tellers?

2. Number Puzzle: Magic Squares

Fill in the 3x3 grid below with numbers 1 through 9, so that each row, column, and diagonal adds up to the same number.

— — —
— — —
— — —

3. Logic puzzle: The Two Doors

You are in a room with two doors. One door leads to freedom, and the other leads to a trap. There are two guards: one always tells the truth, and the other always lies. You may ask one question to one of the guards. What question should you ask to determine which door leads to freedom?

4. Brain Teaser: The Bridge Crossing Problem

Four friends need to cross a bridge at night. They have only one flashlight, and no more than two people can cross at a time. The friends, Phoebe (P), Rachel (R), Chandler (C), and Joey (J), take 1, 2, 5, and 10 minutes to cross the bridge, respectively. When two people cross together, they must go at the slower person's pace. How can all four people cross the bridge in 17 minutes?

5. Lateral Thinking Puzzle: Light Bulb Switches

You are in a room with three light switches. Each switch controls one of three light bulbs in another room. You cannot see the bulbs from where you are but you know they're all off. You may flip the switches however you like, but once you open the door to the room with the bulbs, you cannot flip any more switches. How can you determine which switch controls which bulb?

6. Word Puzzle: Anagram Challenge

Unscramble the following letters to form a word related to computer science:

T A R L G I O M H

1. Only Bob. 2. One solution, top to bottom and left to right: 8 1 6 3 5 7 4 9 2. 3. Ask either guard, "If I were to ask the other guard which door leads to freedom, which door would they point to?" 4. P and R; P; C and J; R; P and R; P; C and J; R; P and R. 5. Turn on the first switch and leave it on for a few minutes. Turn off the first switch and turn on the second switch. Open the door to the room with the bulbs. The bulb that is on corresponds to the second switch. The bulb that is off and warm corresponds to the first switch. The bulb that is off and cold corresponds to the third switch. 6. algorithm

BUILDING CONNECTIONS

Let Us Know What's Happening

Please keep in touch! Contact Professor Lorelei Koss (koss@dickinson.edu) with any news, or just to say hi. We love to hear from you.