Monroe Stephenson

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Employment History

Fall 2022 — **TA for Perkinson's Math 372** Reed College Mathematics Department
Graded 25 short-answer problem sets a week for a course on algebraic combinatorics.

Spring 2022 — **TA for Robinson's Math 332** Reed College Mathematics Department
Graded 40 short-answer problem sets a week for an introductory algebra course.

Fall 2021 — **TA for Jerry Shurman's Math 111 and 202** Reed College Mathematics Department
Graded 40 short-answer problem sets a week for an introductory calculus course and an upper division calculus course.

Note-Taker for Math 321 Reed College DAR Office
Took extensive notes in my real analysis course for the DAR office of Reed College.

Spring 2021– — **Math Drop-In Center Tutor** Reed College Office of Academic Support
Worked as a tutor in the drop-in center which offers free tutoring for any students enrolled in Math 111, 112, 113, 201, or 202.

Spring 2021 — **Course Assistant for Math 113** Reed College Mathematics Department
Organized and ran evening help sessions for Reed's Discrete Structures course for Pommersheim and Perkinson's classes.

Fall 2020-Spring 2021 — **Physics 101/102 Lab TA** Reed College Physics Department
Instructed and guided online lab sessions weekly and graded lab reports.

Fall 2020– — **Individual Tutor** Reed College Office of Academic Support
Tutor for Physics 101/102, Math 112, Math 113, Math 201, Math 202, Math 311, Math 321, Math 332, Math 342, and Math 372.

Fall 2020 — **TA for Nicholas Davidson's Math 111 course** Reed College Mathematics Department
Graded 40 short-answer problem sets a week for introductory calculus course.

Note-Taker for Philosophy 202 Reed College DAR Office
Took extensive notes in my philosophy course for the DAR office of Reed College.

Research History

Fall 2022–Spring 2023 — **Senior Thesis** Reed College
In my senior year, I am working under Dave Perkinson on where I am looking to prove the log-concavity of Kazhdan-Lusztig Polynomials on representable matroids.

Summer 2022 — **REU Participant: Combinatorial Hodge Theory** Einstein Institute of Mathematics
In the summer of 2022, I participated in the inaugural Hebrew University REU. Specifically, I worked under Karim Adiprasito on researching Lefschetz Properties in application to showing anisotropy in general characteristic specifically on the moment curve, implying the g-conjecture. Our current draft can be found here.

Research History (continued)

Spring 2022 — **Independent Research: Algebraic Combinatorics** Reed College
In the spring of 2022, I worked with Dave Perkinson and a couple of fellow students on an open question regarding maximal chains in the k-Bruhat order over the symmetric group. I conducted this research as part of an independent study on the combinatorics of Coexter groups.

Summer 2021 — **REU Participant: Commutative Algebra** University of Michigan
In the summer of 2021, I participated in the REU at the University of Michigan under Jennifer Kenkel, Janet Page, and Daniel Smolkin. We explored the asymptotic behavior of differential powers of ideals, specifically relating simple $\mathcal{D}$-modules to the differential closure of ideals. Currently, you can find our REU paper here, and our pre-print is here.

Summer 2020 — **REU Participant: Computational Modeling** Portland State University
In the summer of 2020, I participated in the "altREU" at Portland State (since COVID-19 caused the NSF to drop funding, it was deemed the altREU). I worked with Bhavana Panchumarthi under Art Duval of UTEP, and later with Dave Perkinson of Reed, on the Abelian Sandpile Model and its applications to network topology and DDoS. Paper in progress on the results we found.

Summer 2019 — **Research Assistant** Texas Tech University
In the summer of 2019, I worked under Andrew Whitbeck within the Experimental High-Energy Particle department at TTU, working towards developing the LDMX project. My final writeup can be found here.

Education

Fall 2019 – Spring 2023 — **B.A. Mathematics, Reed College**

Spring 2022 — **Semester Abroad (Virtually) at Math in Moscow**
Enrolled in "Introduction to Commutative and Homological Algebra" and "Algebraic Geometry"

Fall 2020 — **Semester Abroad (Virtually) at Budapest Semester of Mathematics**
Enrolled in Real Functions and Measures

Research Publications

1. Adiprasito, K., Hou, K., Kiyohara, D., Koizumi, D., & Stephenson, M. (2022). The moment curve suffices. *Manuscript in progress*.
2. Kenkel, J., McPherson, L., Page, J., Smolkin, D., Stephenson, M., & Yang, F. (2021). Asymptotic behavior of differential powers. *Submitted to the Journal of Pure and Applied Algebra*, arXiv 2111.15653.
3. Panchumarthi, B., & Stephenson, M. (2020). Analyzing Network Topology for DDoS Mitigation Using the Abelian Sandpile Model. *In Preparation*.

Skills

Languages — Native English, Conversational Spanish, Conversational German

Coding — LaTeX, Sage, Python, Java, Mathematica, Macaulay2

Miscellaneous Experience

Awards and Achievements

2022 — **Churchill Scholarship Nomination**, Full-ride scholarship for Churchill College, Cambridge nominations, only two students are nominated per institute.

Sperling Scholarship Finalist, Full-ride scholarship for Cambridge upon admisson to King's College, Cambridge.

2019-2022 — **President's Commendation for Excellence 2019-2022**, The only academic honor given at Reed College, denoting those whom represent the top 5% of Reed's class in that year.

2021 — **Evans Scholarship**, A $\$10,000$ scholarship for an exceptional student at Reed College.

2020 — **Brodie Family Scholarship**, A $\$32,000$ scholarship for an exceptional student at Reed College.

2019 — **Don and Sybil Harrington Scholarship**, A $\$20,000$ scholarship for exceptional STEM students, funded by the Harrington Foundation started by Sybil Harrington, former Director of the Board of the Metropolitan Opera.

Texas Eastern Star Scholarship, Statewide scholarship given to a single exceptional student in Texas with familial ties to the Eastern Star Organization, the sister organization of the Free Masons.

2018 — **AP Scholar**, Given by the College Board to distinguish students who succeed in on their college level tests.

2017 — **Regional Finalist for UIL Mathematics**, Competed in the Texas UIL mathematics competition as a sophomore and advanced to Regionals. I earned a top score the Northern Texas Region (one of the 4 regions by UIL).

Organizations

Fall 2020-Spring 2023 — **SL(M) Leader** SL(M) is a student-run organization focusing on building community within the mathematics department. We also focus on facilitating communication between faculty and students, particularly by organizing faculty meetings with the SL(M) leaders. We also have developed the student colloquium where any student is welcome to present their recent mathematical work.

Spring 2020 — **Spring Symposium** I participated in the Spring Symposium which helps first-year students learn necessary college skills such as time management. Primarily, the group consisted of first-generation college students like myself, and other minority groups.

2019-2020 — **Equity and Social Justice Cohort (ESC)** I was part of the inaugural ESC, where we worked with on campus staff, and off campus organizations to benefit our community. We engaged in biweekly meetings and community service.

Funded Visits

August 2022 — **Max Plank Institute for Mathematics in the Sciences:** *Leipzig, Germany*
Invited to MPI to interview for Fulbright Fellowship Opportunity under Bernd Sturmfels with accommodations covered.

Presentations

November 2022 — **Reed College Student Colloquium**
"*Anisotropy on the Moment Curve*"

October 2022 — **Reed College Mathematics Colloquium**
"*An Invitation to Combinatorial Hodge Theory*"

Miscellaneous Experience (continued)

July 2022 — **Final Presentation for the REU at Hebrew University**
"*The Moment Curve Suffices*"

June 2022 — **Hebrew University Graduate Student Seminar**
"*Combinatorics of Coxeter Groups and their Applications to Geometry*"

April 2022 — **JMM Poster Session**
"*Characterization of Simple $\mathcal{D}$-modules by the Differential Closure Operator*"

September 2021 — **Reed College Mathematics Colloquium**
"*Characterization of Simple $\mathcal{D}$-modules by the Differential Closure Operator*"

August 2021 — **Final Presentation for the REU at the University of Michigan**
"*Characterization of Simple $\mathcal{D}$-modules by the Differential Closure Operator*"

October 2020 — **Reed College Mathematics Colloquium**
"*Analyzing Network Topology for DDoS Mitigation Using the Abelian Sandpile Model*"

September 2020 — **Reed College Student Physics Seminar**
"*Analyzing Network Topology for DDoS Mitigation Using the Abelian Sandpile Model*"

August 2020 — **Final Presentation for altREU at Portland State University**
"*Analyzing Network Topology for DDoS Mitigation Using the Abelian Sandpile Model*"