

George Brooks

Curriculum Vitae

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Columbia, SC 29225
🌐 www.ghbrooks.me

Research Interests

Extremal combinatorics, focusing on spectral graph theory, Turán-type problems in hypergraphs (including the ℓ_2 -norm), and discrete curvature of graphs.

Education

- 2020–2025 **Ph.D. Mathematics**, *University of South Carolina*, Columbia, SC
Advisor: Dr. Linyuan Lu
- 2012–2018 **B.S. Mathematics**, *Saginaw Valley State University*, University Center, MI
Minor in Chemistry

Academic Employment

- 2025– **Postdoctoral Fellow**
Present NSF Research Training Group in Mathematical Foundations of Data Science
Department of Mathematics, University of South Carolina, Columbia, SC
- 2025– **Adjunct Professor**
Present Division of Health, Mathematics & Sciences, Columbia College, Columbia, SC
- 2020–2025 **Graduate Instructor – Teaching Assistant**
Department of Mathematics, University of South Carolina, Columbia, SC
- 2018–2020 **Adjunct Instructor – Tutoring Center**
Science & Math Division, Northwestern Michigan College, Traverse City, MI

Teaching Experience

University of South Carolina

- 2021– **Instructor of Record**, *Department of Mathematics*
- Present
- MATH 374: Discrete Structures (Fall 2025)
 - MATH 115: Precalculus Mathematics (Fall 2025)
 - MATH 141: Calculus I (Spring 2025)
 - MATH 374: Discrete Structures (Fall 2024)
 - MATH 115: Precalculus Mathematics (Fall 2024)
 - MATH 115: Precalculus Mathematics (Fall 2023)
 - MATH 174: Discrete Mathematics for Computer Science (Spring 2023)
 - MATH 174: Discrete Mathematics for Computer Science (Fall 2022)
 - MATH 344L/544L: Applied Linear Algebra Laboratory (Spring 2022)
 - MATH 115: Precalculus Mathematics (Fall 2021)
 - MATH 122: Calculus for BA and Social Sciences (Summer 2021)
- 2020– **Teaching Assistant**, *Department of Mathematics*
- Present
- MATH 142: Calculus II - Honors (Fall 2023)
 - MATH 141: Calculus I - Honors (Fall 2021)
 - MATH 142: Calculus II (Spring 2021)
 - MATH 141: Calculus I (Fall 2020)

Columbia College

2025– Present **Adjunct Professor**, *Division of Health, Mathematics & Sciences*
○ MTH 150: Discrete Mathematics (Summer 2025)

Northwestern Michigan College

2019–2020 **Adjunct Instructor**, *Science & Math Division*
○ MTH 111: Intermediate Algebra (Spring 2020)
○ MTH 08: Pre-Algebra (Spring 2020)
○ MTH 08: Pre-Algebra (Fall 2019)

Workshops

May 2023 **AMS Mathematical Research Communities**
Beaver Hollow Conference Center, Java Center, NY
2022– **RTG: Summer School on Mathematical Foundations of Data Science**
Present Department of Mathematics, University of South Carolina, Columbia, SC

Preprints

5. G. Brooks, W. Linz, and R. Luo. “Spectral radius and Hamiltonicity of uniform hypergraphs.” *arXiv:2504.18314* (2025).
4. G. Brooks and W. Linz. “Some exact and asymptotic results for hypergraph Turán problems in ℓ_2 -norm.” *arXiv:2310.09379* (2024).

Publications

3. G. Brooks, W. Linz, and L. Lu “Maximum spectral gaps of graphs.” *Linear Algebra and its Applications* 730 (2026).
2. G. Brooks, F. Osaye, A. Schenfisch, Z. Wang, and J. Yu. “Outerplanar graphs with positive Lin-Lu-Yau curvature.” *Journal of Combinatorics* 16.4 (2025).
1. G. Brooks, M. Gu, J. Hyatt, W. Linz, and L. Lu. “On the maximum second eigenvalue of outerplanar graphs.” *Discrete Mathematics* 348.5 (2025).

Invited Talks

Mar 2025 **AMS Spring Southeastern Sectional Meeting**
Maximum spectral gaps of graphs
Clemson University, Clemson, SC
Nov 2024 **Discrete Math and Combinatorics Seminar**
Maximum spectral gaps of graphs
University of South Carolina, Columbia, SC
Oct 2024 **Graduate Colloquium**
Maximum spectral gaps of graphs
University of South Carolina, Columbia, SC
Feb 2024 **Discrete Math and Combinatorics Seminar**
Outerplanar graphs with positive Lin-Lu-Yau curvature
University of South Carolina, Columbia, SC

- Jan 2024 **AMS Special Session on Ricci Curvatures of Graph and Applications to Data Science**
Outerplanar graphs with positive Lin-Lu-Yau curvature
 Joint Mathematics Meeting, San Francisco, CA
- Nov 2023 **Graduate Colloquium**
On the maximum second eigenvalue of outerplanar graphs
 University of South Carolina, Columbia, SC
- Mar 2023 **Graduate Mini-Conference in Discrete Mathematics**
Introduction to Flag Algebras
 University of South Carolina, Columbia, SC
- Oct 2022 **Graduate Colloquium**
Introduction to Flag Algebras
 University of South Carolina, Columbia, SC

Awards

- 2023–2024 **Outstanding Graduate Teaching Award**
 University of South Carolina – Department of Mathematics

Service

University of South Carolina

- 2024– **Opportunity Scholars Program – Instructor**
 Present TRIO program supporting students from disadvantaged backgrounds.
- 2024– **Partners for Mentoring in Engineering and Computer Science**
 Present Providing gifted high school students academic enrichment in mathematics.
- 2024– **Math Learning Center Coordinator**
 Present Developing Python labs and facilitating LMS integration for MAP and Gateway testing.
- 2022– **RTG: Summer School on Mathematical Foundations of Data Science**
 Present Teaching and mentoring undergraduate research.
- 2024–2025 **Discrete Math and Combinatorics Seminar – Organizer**
 Inviting speakers and operating the seminar.
- 2023–2024 **Graduate Student Instructor Peer Mentor Program**
 Mentoring graduate student instructors of record.
- 2022–2024 **Discrete Reading Seminar – Organizer**
 Topics have included: spectral graph theory, hypergraph container method, etc.
- 2021–2022 **Graduate Advisory Council - Student Representative**
 Represented graduate students in departmental matters.

Volunteer Work

- 2024–2025 Chapin Elementary - Math Outreach
- 2023–2024 Leaphart Elementary - Math Outreach
- 2023–2025 UofSC Annual High School Math Contest - Activity Organizer
- Nov 2021 South Carolina Council of Teachers of Mathematics Conference
- Oct 2021 Oktoberbest 2021: A Symposium on Teaching