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–Present **Postdoctoral Fellow**
NSF Research Training Group in Mathematical Foundations of Data Science
Department of Mathematics, University of South Carolina, Columbia, SC

2025–Present **Adjunct Professor**
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–Present **Instructor of Record**, *Department of Mathematics*
- 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–Present **Teaching Assistant**, *Department of Mathematics*
- 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–
Present

RTG: Summer School on Mathematical Foundations of Data Science
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, W. Linz, and L. Lu. "Maximum spectral gaps of graphs." *arXiv:2408.15476* (2024).

3. G. Brooks and W. Linz. "Some exact and asymptotic results for hypergraph Turán problems in ℓ_2-norm." *arXiv:2310.09379* (2024).

Publications

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–Present	**Opportunity Scholars Program – Instructor** TRIO program supporting students from disadvantaged backgrounds.
2024–Present	**Partners for Mentoring in Engineering and Computer Science** Providing gifted high school students academic enrichment in mathematics.
2024–Present	**Math Learning Center Coordinator** Developing Python labs and facilitating LMS integration for MAP and Gateway testing.
2022–Present	**RTG: Summer School on Mathematical Foundations of Data Science** 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