George Brooks

Curriculum Vitae

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Research Interests

Extremal combinatorics, spectral graph theory, hypergraph Turán theory, and Ricci curvature of graphs with applications to data science.

Education

2020–Present	**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

2020–Present	**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 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)

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

4. G. Brooks, W. Linz, and L. Lu, **Maximum spectral gaps of graphs**. *arXiv:2408.15476* (2024)

3. G. Brooks, F. Osaye, A. Schenfisch, Z. Wang, and J. Yu, **Outerplanar graphs with positive Lin-Lu-Yau curvature**. *arXiv:2403.04110* (2024)

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

1. G. Brooks, M. Gu, J. Hyatt, W. Linz, and L. Lu, **On the maximum second eigenvalue of outerplanar graphs**. *arXiv:2309.08548* (2023)

Invited Talks

Oct 2024 **Graduate Colloquium**
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	**Discrete Math and Combinatorics Seminar – Organizer**
	Inviting speakers and operating the seminar.
2024–Present	**Partners for Minorities in Engineering and Computer Science**
	Providing gifted high school students academic enrichment in mathematics.
2024–Present	**Math Learning Center Coordinator**
	Facilitated LMS integration for MAP and Gateway testing.
2023–Present	**Graduate Student Instructor Peer Mentor Program**
	Mentoring graduate student instructors of record.
2022–Present	**RTG: Summer School on Mathematical Foundations of Data Science**
	Teaching and mentoring undergraduate research.
2022–Present	**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

2023–2024	Leaphart Elementary Math Outreach
2023–2024	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