

Sarah Allred

Curriculum Vitae

Department of Mathematics and Statistics
University of South Alabama
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USA
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Employment

- 2023-present **Assistant Professor**, University of South Alabama.
2022-2023 **Postdoctoral scholar**, Vanderbilt University.

Education

- 2017–2022 **Ph.D., Mathematics**, Louisiana State University.
Advisor: Bogdan Oporowski
Dissertation: *Unavoidable Structures in Large and Infinite Graphs*
- 2016–2017 **M.S., Mathematics**, Louisiana State University.
2012–2016 **B.S., Mathematics**, Auburn University.

Research Interests

- General Combinatorics, Graph Theory
Specific Structural and Extremal Graph Theory

Published papers

1. S. Allred, P. Johnson, M. Murphy, *Forbidding Rainbow Cycles with Edge-Colorings of $K_{m,n}$* , Alabama Journal of Mathematics, **Vol. 38** 2014.
2. S. Allred, P. Johnson, *Theta Graphs are Hall t -chromatic for all $t = 0, 1, 2, \dots$* Bulletin of the ICA, **Vol. 81** 2017.
3. S. Allred, G. Ding, B. Oporowski, *Unavoidable Induced Subgraphs of Large 2-Connected Graphs*, SIDMA, **Vol. 37, Iss. 2** 2023.

Accepted papers

4. S. Allred, E. Curl, S. Fallat, S. Nasserar, H. Schuerger, R.R. Villagrán, P.K. Vishwakarma, *The Strong Spectral Property of Graphs: Graph Operations and Barbell Partitions.*, to appear in *Graphs and Combinatorics* arXiv: 2303.17138

Preprints

5. S. Allred, C. Erickson, K. Grace, H.T. Hall, A. Jensen, *A Combinatorial Bound on the Number of Distinct Eigenvalues of a Graph* arXiv:2209.11307
6. S. Allred, G. Ding, B. Oporowski, *Unavoidable Induced Subgraphs of Infinite 2-Connected Graphs.* arXiv: 2211.06416

Extended Research Travel

- Summer 2021 **Participant** AMS Mathematics Research Community
Topic: Approaches to Inverse Problems using Combinatorics and Linear Algebra

Internships

- Summer 2020 **Software Engineering Institute, Carnegie Mellon University**
- Participated in ongoing research into investigating alterations to compressed archives:
 - Developed a prototype framework for format specifications
 - Represented data at multiple layers of abstraction, from binary encoding to human-readable description
 - Work product consisted of:
 - A series of technical presentations to a group with interests that include digital forensics, network security, and machine vision
 - A binary file parsing code in Python to read data and construct a higher-order representation of the file data

Awards, Honors, and Distinctions

Louisiana State University

- 2020 **Certificate of Teaching Excellence**
2020 **David Oxley Graduate Student Teaching Award**
2016–2018 **Board of Regents Fellow**

Presentations

Invited talks

- 2023 **Unavoidable Induced Subgraphs of Large and Infinite 2-connected graphs**, Georgia Tech Graph Theory Seminar, *Auburn University*.
- 2023 **Unavoidable Induced Subgraphs of Infinite 2-connected graphs**, AMS Spring Southeastern Sectional Meeting.
- 2023 **Unavoidable Induced Subgraphs of Infinite 2-connected graphs**, Joint Mathematics Meetings.
- 2022 **Unavoidable Induced Subgraphs of Large and Infinite 2-connected graphs**, Auburn Combinatorics Seminar, *Auburn University*.
- 2022 **Unavoidable Induced Subgraphs of Large and Infinite 2-connected graphs**, Joint Vanderbilt/MTSU Graph Theory and Combinatorics Seminar, *Vanderbilt University*.
- 2022 **Unavoidable Induced Subgraphs of Large and Infinite 2-connected graphs**, Virtual Women in Combinatorics Seminar.
- 2022 **Unavoidable Induced Subgraphs of Large 2-connected graphs**, Joint Mathematics Meetings.
- 2020 **Unavoidable Induced Subgraphs of Large 2-connected graphs** Matroid Union Seminar, *University of Waterloo*.
- 2018 **Theta Graphs are Hall t -chromatic**, Auburn REU, *Auburn University*

Other talks

- 2020 **Unavoidable Induced Subgraphs of Large 2-connected graphs** LSU Combinatorics Seminar, *Louisiana State University*.
- 2019 **Unavoidable Induced Subgraphs of Large 2-connected graphs** 7th Mississippi Discrete Math Workshop, *University of Mississippi*

- 2019 **Unavoidable Induced Subgraphs of Large 2-connected graphs** 31st Cumberland Conference on Combinatorics, Graph Theory and Computing, *University of Central Florida*.
- 2018 **Combinatorics Introduction Talk**, GEAX Program, *Louisiana State University*.
- 2018 **Theta Graphs are Hall t -chromatic**, Southeastern International Conference on Combinatorics, Graph Theory, and Computing, *Florida Atlantic University*.

Conferences Attended

- 2023 **32nd Cumberland Conference on Combinatorics, Graph Theory and Computing**, *Middle Tennessee State University*.
- 2023 **AMS Spring Southeastern Section Meeting**, *Georgia Institute of Technology*.
- 2023 **Joint Mathematics Meetings**, Boston
- 2022 **Workshop on Graph Theory and Combinatorics in Memory of Robin Thomas**, *Georgia Institute of Technology*.
- 2022 **Joint Mathematics Meetings**, *virtual*.
- 2020 **Virtual Grace Hopper Celebration**, *virtual*.
- 2019 **7th Mississippi Discrete Math Workshop**, *University of Mississippi*.
- 2019 **31st Cumberland Conference on Combinatorics, Graph Theory and Computing**, *University of Central Florida*.
- 2019 **AMS Spring Southeastern Sectional Meeting**, *Auburn University*.
- 2018 **6th Mississippi Discrete Math Workshop**, *University of Mississippi*.
- 2018 **AMS Spring Southeastern Sectional Meeting**, *Vanderbilt University*.
- 2018 **49th Southeastern International Conference on Combinatorics, Graph Theory, and Computing**, *Florida Atlantic University*.
- 2017 **5th Mississippi Discrete Math Workshop**, *University of Mississippi*.
- 2014 **REU in Algebra and Discrete Mathematics at Auburn University**.

Teaching

I was the instructor of record, where I had the sole responsibility of preparing and presenting lectures, assigning and grading tests, and assigning the overall course grade for the following courses.

University of South Alabama

Fall 2023 **Finite Mathematics**

Fall 2023 **Discrete Math Structures**

Vanderbilt University

Spring 2023 **Error-Correcting Code and Cryptography**

Spring 2023 **Methods of Linear Algebra**

Fall 2022 **Error-Correcting Codes and Cryptography**

Louisiana State University

Fall 2021 **Honors Calculus I**

Summer 2021 **Differential Calculus**

Spring 2021 **Honors Calculus II**

- Fall 2020 **Honors Calculus I**
- Spring 2020 **College Algebra**
 Taught students with ACT score less than 19 using the R2R format. Classes met twice a week for 50 minutes. The students were required to spend 4.5 hours in a tutoring computer lab in addition to class. All assignments were given using the MyMathLab software.
- Fall 2019 **Calculus I**
- Summer 2019 **Calculus II**
 Homework assignments were given using the WebAssign software.
- Spring 2019 **Calculus I**
 Homework assignments were given using the WebAssign software.

Service and Outreach

Vanderbilt University

2023 **Math Tutor**, Community Achieves at H.G. Hill Middle School

Louisiana State University

2021 **Chair**, G.E.A.U.X Orientation Program for New Math Graduate Students, *Louisiana State University*.

2020-2022 **Organizer**, LSU Combinatorics Seminar, *Louisiana State University*
 Organized and ran the LSU Combinatorics Seminar as a virtual seminar with participants from multiple different countries.

Fall 2020 **Mathematics Graduate Student Mentor Program** Started a tiered mentoring program for mathematics graduate students, pairing first-year graduate students with more advanced students for support.

Spring 2020 **Mentor for the Communicating Math Graduate Course** *Louisiana State University*.

Fall 2019 **Mentor for the Communicating Math Graduate Course I** mentored a first year graduate student. I met with the student several times throughout the semester as they observed my class, and guided them through writing and presenting a lecture in my Calculus I course. *Louisiana State University*.

Fall 2019-2022 **Department Representative to the Graduate Student Association**
 Represented the mathematics graduate students in the Graduate Student Association and presented any concerns graduate students had to the GSA. *Louisiana State University*

2019 **Math with Middle and High School Students** Gave a talk on assorted topics in Graph Theory to both a middle school and a high school math class.

2017-2020 **Committee Member**, G.E.A.U.X Orientation Program for New Math Graduate Students, *Louisiana State University*.

2017-2022 **Mentor**, KIDS HOPE
 Mentored an elementary student in reading, mathematics, and life skills.

2017 **Proctor and Grader**, High School Math Contest, *Louisiana State University*

Professional Memberships

American Mathematical Society

Association for Women in Mathematics

References

Bogdan Oporowski, LSU (PhD advisor)
Guoli Ding, LSU
Shaun Fallat, University of Regina
James Oxley, LSU (Teaching)
Larry Rolen, Vanderbilt University (Teaching)

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