

# Sarah Allred

## Curriculum Vitae

Department of Mathematics and Statistics  
University of South Alabama  
Mobile, AL 36688  
USA  
✉ sarahallred@southalabama.edu

### 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

### Papers

#### 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**.

#### Preprints

4. 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
5. S. Allred, G. Ding, B. Oporowski, *Unavoidable Induced Subgraphs of Infinite 2-Connected Graphs*. arXiv: 2211.06416
6. 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*. arXiv: 2303.17138

#### Papers in preparation

7. S. Allred, M. Ellingham, *Unavoidable Induced Subgraphs of Large and Infinite 2-Edge-Connected Graphs*.

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## Extended Research Travel

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

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## 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

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## 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**

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## 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*.

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## 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**.

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## 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 Mathematics**

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.

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## 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*

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## Professional Memberships

American Mathematical Society

Association for Women in Mathematics

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## References

Bogdan Oporowski, LSU (PhD advisor)

[bogdan@math.lsu.edu](mailto:bogdan@math.lsu.edu)

Guoli Ding, LSU

[ding@math.lsu.edu](mailto:ding@math.lsu.edu)

Shaun Fallat, University of Regina

[Shaun.Fallat@uregina.ca](mailto:Shaun.Fallat@uregina.ca)

James Oxley, LSU (Teaching)

[oxley@math.lsu.edu](mailto:oxley@math.lsu.edu)

Larry Rolen, Vanderbilt University (Teaching)

[larry.rolen@vanderbilt.edu](mailto:larry.rolen@vanderbilt.edu)