

# Cole X. Swain

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## PROFILE

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- Motivated mathematics student interested in combinatorics
- Research experience in Enumerative Graph Theory and Tiling Theory
- Extensive involvement and academic achievement within the Montevallo Mathematics Program
- Active research, tutoring, and leadership experience
- Creative and detail-oriented with an optimistic and empathetic point of view

## EDUCATION

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### University of Montevallo

Montevallo, AL

*Bachelor of Science in Mathematics, Minor in Computer Science*

*August 2021 – May 2025*

- GPA: 3.870 out of 4.0 — Honors Diploma — Presidents List — Deans List
- **Relevant Coursework:** Real Analysis, Complex Analysis, Topology, Abstract Algebra, Graph Theory, Algorithm Development and Data Structures, Database Management Systems

## ACADEMIC HONORS, AWARDS, & SCHOLARSHIPS

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### University of Montevallo

Montevallo, AL

*Bachelor of Science in Mathematics, Minor in Computer Science*

*August 2021 – May 2025*

- Montevallo Ambassador Program Scholarship (Full Tuition and Room/Board Scholarship)
- 2024 Mathematics Senior Elite Award (Awarded annually to one outstanding senior student)
- Dean of Arts and Sciences Scholarship
- Sabia Family Legacy Endowed Scholarship for Honors Students
- Jacquita Knight Hauserman Scholarship (Awarded by Mathematics Department)
- Rebecca Norrell Garza Memorial Scholarship (Awarded by Mathematics Department)
- 2023 Who's Who recipient (Awarded based on academic achievement, service to the university community, and campus involvement)

## TECHNICAL SKILLS

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**Languages:** Java, Python, SQL (SQLite), HTML/CSS, LaTeX

**Developer Tools:** Git, Google Cloud Platform, VS Code, Visual Studio, PyCharm, IntelliJ, Eclipse, SageMath, DB Browser

**Libraries:** NumPy, SciPy, matplotlib

**Software:** Adobe Suite, Microsoft Suite, Google Suite, IPE, DB Browser, pgAdmin, Canva, PostgreSQL

## RESEARCH EXPERIENCE

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### Undergraduate Researcher

June 2024 – August 2024

*Iowa State University Research Experience for Undergraduates*

*Ames, IA*

- Researched and enumerated maximal independent sets in several grid-like graphs
- Explored other ideas such as non-isomorphic maximal independent sets along with other statistics of maximal independent sets in grid-like graphs
- Collaborated with three undergraduate students, a graduate student mentor, and faculty advisor Dr. Anna Halfpap
- Funded through NSF Grant DMS-1950583

## Undergraduate Researcher

January 2023 – November 2023

*University of Montevallo Undergraduate Research Program*

*Montevallo, AL*

- Researched visible square tilings and established a lower bound for the number of visible tilings which have an even number of squares
- Worked under the guidance of Dr. Benton Tyler

## Undergraduate Researcher

August 2024 – May 2025

*University of Montevallo Undergraduate Research Program*

*Montevallo, AL*

- Extended the square tiling research done in 2023 by exploring how different tiling methods affect the limits of the area and total side-length of square tilings
- Worked under the guidance of Dr. Benton Tyler

## Senior Thesis Student

August 2024 – May 2025

*University of Montevallo Mathematics Program*

*Montevallo, AL*

- Compiled a selection of theorems and definitions covering square tilings, visible square tilings, Fibonacci square tilings, and several different triangle tilings

## PUBLICATIONS

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\*Note that all authors have been alphabetized, as is customary in the Mathematical Sciences.

## Research

2. Levi Axelrod. Nathan Bickel. Anastatsia Halfpap. Luke Hawranick. Alex Parker. **Cole X. Swain**. *Statistics of maximal independent sets in grid like graphs*. To be submitted.
1. Michael Doerfler. **Cole X. Swain**. Benton Tyler. *Enumerating Visible Tilings*. Geombinatorics Quarterly. Volume 34(2). Pages 65-73. October 2024.

## CONFERENCES, PRESENTATIONS, AND WORKSHOPS

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### JMM AMS-PME Undergraduate Student Poster Session

January 2025

*Joint Mathematics Meetings*

*Seattle, WA*

- Presented a poster presentation titled *Enumerating Maximal Independent Sets in Grid-like Graphs*

### Summer Research Student Panel

November 2024

*University of Montevallo*

*Montevallo, AL*

- Participated in a panel to bring awareness to the summer research opportunities that exist for undergraduate students in mathematics

### Research Experience for Undergraduates

August 2024

*Iowa State University*

*Ames, IA*

- Presented a poster presentation titled *Enumerating Maximal Independent Sets in Grid-like Graphs*
- Presented an oral presentation titled *Statistics of Maximal Independent Sets in Grid-like Graphs*

### Southeastern Regional COPLAC Undergraduate Research Conference

April 2024

*University of Montevallo*

*Montevallo, AL*

- Presented an oral presentation titled *Enumerating Visible Tilings*

### Troy Mathematics Fest

April 2024

*Troy University*

*Troy, AL*

- Presented an oral presentation titled *Enumerating Visible Tilings*

### MAA South-Eastern Sectional Meeting

March 2024

*University of Tennessee Knoxville*

*Knoxville, TN*

- Presented an oral presentation titled *Enumerating Visible Tilings of Squares*

**Faculty Convocation Student Panel***University of Montevallo*

August 2023

*Montevallo, AL*

- Participated in “The College Experience Revisited” student panel
- Discussed what the “college experience” means post-COVID and what students feel they need from their academics to feel confident in their career start immediately post-graduation

**Troy University Math Fest***Troy University*

April 2023

*Troy, AL*

- Presented an oral presentation titled *Tilings and Visible Tilings*

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**CAMPUS LEADERSHIP ROLES**

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**President of UM Mathematics Club**

January 2022 – December 2024

*University of Montevallo, Mathematics Club**Montevallo, AL*

- Organized yearly Pi Day fundraising event by communicating with faculty and fellow students
- Raised money for the Boys & Girls Club of Montevallo through the Pi Day event
- Planned and conducted biweekly meetings consisting of faculty seminars, student seminars, mathematical crafts, and more
- Sponsored (using club funding) multiple students to go to Troy University Math undergraduate conference to present research and network with peers outside of our university

**Vice President of Kappa Mu Epsilon Honor Society**

February 2023 – Present

*University of Montevallo Mathematics Program**Montevallo, AL*

- Helped develop an appreciation for the beauty of mathematics in my peers
- Led initiation ceremonies for new members

**Honors Peer Mentor**

August 2022 – December 2022

*University of Montevallo, Honors Program**Montevallo, AL*

- Helped lead sessions and breakout groups for Honors Program orientation
- Advised first-year honors students on academic and personal matters
- Collaborated with other peer mentors to plan programs
- Maintained office hours, planned campus resource tours, and attended Honors 100 course

**Head Montevallo Master**

September 2021 – Present

*University of Montevallo, Montevallo Masters**Montevallo, AL*

- Served as an ambassador to receive special guests, donors, and VIPs of the university
- Coordinated high-level special events in conjunction with the Director of University Events
- Recruited and trained students for the Montevallo Master Program
- Determined and assigned Montevallo Master duties for university-wide ceremonies

**President of UM Astronomy Club**

January 2022 – May 2024

*University of Montevallo, Astronomy Club**Montevallo, AL*

- Planned and assisted with biweekly star observation nights
- Operated a 20-inch PlaneWave CDK20 telescope
- Held meetings with our advisor and other members of the astronomy club to educate the public about space

**Freshman Forum Member**

August 2021 – May 2022

*University of Montevallo, Student Government Association**Montevallo, AL*

- Represented the best interests of students and peers
- Successfully passed a bill to alter the visitation policies amongst campus housing
- Planned and coordinated goat yoga event for entire campus

**Representative for Ramsay Hall**

August 2021 – May 2022

*University of Montevallo, Resident Hall Association**Montevallo, AL*

- Provided a formal means for residents to offer feedback on their on-campus living experience
- Attended monthly meetings to relay feedback to Residence Life Coordinator
- Participated in finding and implementing solutions to problems voiced by residents
- Helped plan and lead campus-wide programs to promote residential community

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**CAMPUS EMPLOYMENT AND INVOLVEMENT**

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**Student Reservation Assistant**

September 2023 – Present

*University of Montevallo, Calendar Office**Montevallo, AL*

- Acted as a point of contact for users of university facilities and grounds for both on and off-campus requestors
- Maintained a working knowledge of university policies and procedures with emphasis on exceptional customer service and communication skills
- Maintained a current inventory of all university facilities and grounds
- Worked as a member of the 25Live reservation software implementation team
- Served as a student system administrator for the 25Live SQL database

**Photographer and Crossword Designer**

August 2021 – May 2022

*University of Montevallo Student Newspaper**Montevallo, AL*

- Worked diligently and creatively to accomplish tasks under strict deadlines
- Utilized CrossFire to generate original crossword puzzles
- Captured photographs to complement articles on various community events

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**OFF-CAMPUS EMPLOYMENT**

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**High School Calculus Tutor**

September 2022 – May 2023

*Cole Swain Tutoring**Montevallo, AL*

- Tutored high school students in AP Calculus

**Photobooth Attendant**

September 2023 – Present

*Elevated Entertainment**Birmingham, AL*

- Set up, operated, and maintained photobooth equipment to ensure high-quality photos and smooth functionality during events
- Engaged with guests, assisting them with photobooth usage and providing props to enhance their experience and enjoyment
- Collaborated with event coordinators and team members to deliver seamless service, tailoring setup and operations to meet event-specific requirements

**Assistant DJ**

September 2023 – Present

*Elevated Entertainment**Birmingham, AL*

- Supported lead DJ with equipment setup, breakdown, and troubleshooting to ensure optimal sound quality and seamless event flow
- Assisted with playlist curation and song transitions, adapting music selection based on audience engagement and event mood
- Managed audio levels and technical adjustments during performances, maintaining sound clarity and volume consistency