

Cole X. Swain

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PROFILE

- 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

University of Montevallo

Montevallo, AL

Bachelor of Science in Mathematics, Minor in Computer Science

August 2021 – May 2025

- GPA: 3.870 — 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

University of Montevallo

August 2021 – May 2025

University of Montevallo

Montevallo, AL

- Montevallo Ambassador Program Scholarship (Full Tuition and Room/Board Scholarship)
- 2024 Mathematics Senior Elite Award (Awarded to one outstanding senior student a year by their respective department)
- 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 UM community, and campus involvement)

TECHNICAL SKILLS

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, postgresSQL

RESEARCH EXPERIENCE

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
- Worked with a team of three other undergraduate students along with a graduate student mentor and a faculty advisor
- Funded through NSF Grant DMS-1950583

Undergraduate Researcher

January 2023 – November 2023

*University of Montevallo Undergraduate Research**Montevallo, AL*

- Researched visible square tilings and established a lower bound for the number of visible tilings that have an even number of squares
- Worked with one undergraduate student under the guidance of Dr. Benton Tyler
- Funded through the University of Montevallo's Undergraduate Research Program

Undergraduate Researcher

August 2024 – May 2025

*University of Montevallo Undergraduate Research**Montevallo, AL*

- Extended the square tiling research done in 2023 by looking into how different tiling methods affect the limits of the area and total side-length of square tilings
- Worked with one undergraduate student under the guidance of Dr. Benton Tyler
- Funded through University of Montevallo's Undergraduate Research Program

Senior Thesis Student

August 2024 – May 2025

*University of Montevallo**Montevallo, AL*

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

PUBLICATIONS

*Note that all authors have been alphabetized, as is custom 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*. ArXiv. 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

University of Montevallo 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

Iowa State University 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*

University of Montevallo Faculty Convocation Student Panel

August 2023

*University of Montevallo**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

April 2023

*Troy University**Troy, AL*

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

PROFESSIONAL, COMMUNITY, & CAMPUS INVOLVEMENT

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 members 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 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

August 2021 – Present

*University of Montevallo Mathematics Department**Montevallo, AL*

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

High School Calculus Tutor

September 2022 – May 2023

*Cole Swain Tutoring**Montevallo, AL*

- Tutored High School students in AP Calculus
- Observed improvements in student performance and grades

Peer Mentor for UM Honors Program

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

Student Reservation Assistant at UM Calendar Office

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

- Head Montevallo Master** September 2021 – Present
University of 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 state of the art 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 of UM SGA** 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 school wide goat yoga event
- 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
- Summer Worker** July 2023 – August 2023
University of Montevallo Theater Department *Montevallo, AL*
- Organized and thoroughly cleaned the technical theater workshop
 - Assisted in creating a new optimized layout for the workshop
- Photographer and Crossword Designer** August 2021 – May 2022
University of Montevallo Student Newspaper *Montevallo, AL*
- Worked diligently and creatively to accomplish work under strict deadlines
 - Utilized CrossFire to generate original crossword puzzles
 - Captured photographs to complement articles on various community events
- Photobooth Attendant** September 2023 – Present
Elevated Entertainment *Birmingham, AL*
- Set up, operated, and troubleshooted photobooth equipment to ensure high-quality photo outputs 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