

Math capstone: Students use equations to solve real-life issues

What do COVID-19, taxicabs and mindsets have in common? The answer may surprise you: math. Math is the abstract science of using calculations, shapes and quantity to solve a problem. But multiple steps, numbers and signs do more than complete mathematical equations.

They can be used to unravel everyday problems, as well. That's exactly what three seniors did in November for their capstone projects. They used statistics and data to answer real-life challenges like discovering a direct taxicab distance between two coordinates; seeing if students develop the mindset they're not good at math; and whether the COVID shutdown effected grades at Georgia College.

"The purpose is to synthesize ideas learned in previous coursework to go beyond the prescribed curriculum in terms of content, depth and approach and help our students develop the ability to work independently on a project of their choosing," said Dr. Robert Blumenthal, chair of mathematics.

In the past four years, 62 math majors have presented capstone research. Each chose a topic of interest and a professor to mentor them. Students engage in a year of reading, research and working mathematical puzzles. It ends with the annual Capstone Day, where they present findings in front of faculty and family.

Senior Seth Rozelle of Warner Robins is working on a degree in math with a minor in computer science. He chose to do his undergraduate research on COVID and whether online learning during lockdowns effected grades at Georgia College.

He thought it'd be a timely and popular topic. His research required rigorous data analysis, studying grade distribution in 19 areas of study across campus.

Overall, he learned students performed better in the spring months of the pandemic, than previously.

"We were observing whether the distribution of grades at Georgia College changed significantly in any way. The short answer is it did," Rozelle said. "In spring of 2020, there were significantly more A's, less failing grades and slightly more withdrawals in most categories. Then, in spring 2021, grades seemed to come back to pre-COVID numbers."

Rozelle said his research is "immediately relevant" and can shed light on academic learning during a global pandemic. Going forward, it can be used to determine if hybrid learning is better in emergencies.

His mentor, Dr. Jebessa Mijena, associate professor of math, teaches courses in statistics, calculus sequences and differential equations. Capstone students interested in statistics, data science and machine learning generally come to him for direction.

It's his job to offer suggestions and guidance but otherwise step back.

"These types of capstone projects teach our students about completing tasks independently without much help from the professors," Mijena said.

Another senior math major, Natalie Taylor of Rossville, Georgia, did her capstone under the direction of Dr. Rodica Cazacu. Most people think the distance between two destinations is the mileage

given by Google Maps—a direct line, what's known in math as "Euclidean distance." But traveling to another place often involves twists and turns. Taylor used horizontal and vertical distance between two points to find what's called "taxicab distance."

Senior math education major Morgan Grey of Dacula, Georgia, studied the stigma around math. She met several times a week with Dr. Doris Santarone, assistant professor of math education, for assistance. Grey was deeply interested in why some people believe their math abilities are predetermined and cannot change.

She collected data from hundreds of students in grades K-12 to determine their "mindsets." She also looked at teaching methods to see if attitudes can be altered.

"From a young age, I wondered why some people called themselves a math person, meaning they could do math well, or why they weren't a math person," Grey said. "Contrary to this is a 'growth mindset,' when people believe they're born with a set of basic qualities that can be changed and improved through hard-work and strategies that foster growth."

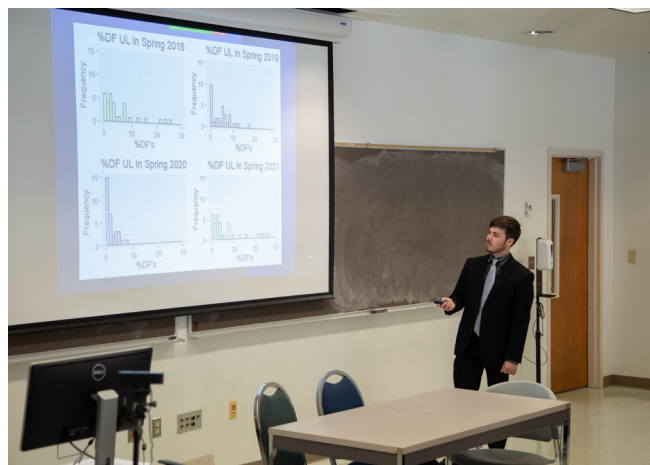
Grey found most children start out with healthy mindsets. As grade levels increase in math, however, this positive attitude declines. A significant decrease occurs between kindergarten and 3rd grade, Grey learned, when multiplication and fractions are introduced and "students begin to doubt their abilities."

She was surprised to find a similar problem with the mindsets of teachers. Teachers in higher grade levels are less convinced students can overcome difficulties in math.

This discovery could lead to finding out why and ways to fix it, Santarone said. Real-life problems are challenging to solve—and that's why Santarone loves math. It's also why so many students consider the math capstone to be the highlight of their college experience.

In his department, Blumenthal emphasizes critical thinking and making informed decisions based on evidence. Faculty focus on interdisciplinary work and making connections between disciplines.

The math capstone is the crowning glory.



Senior Seth Rozelle presents his math capstone research.

GC's Center for Health and Social Issues works with Baldwin County to aid alumna, community member



Loretta Brown's home before demolition

After the toughest years of her life, alumna Loretta Brown, '80, experienced more hardship when her home burned down this year. To alleviate the cost of demolition and rebuilding, the Center for Health and Social Issues (CHSI) partnered with the Baldwin County government and a local demolition contractor.

"The Center for Health and Social Issues works in diverse communities across Baldwin County and Central Georgia to facilitate improved health and reduce social disparities," said Damian Francis, director of the CHSI. "In Brown's case, her social circumstances stood out, as she was struggling day-to-day. A person's health is only as good as their social circumstance. Brown's predicament is why the CHSI exists, to address 'social issues.'"

Brown graduated with a degree in therapeutic recreation, now called recreational therapy, and specialized in helping the mentally ill and those with intellectual disabilities.

When her home burned down, she was at her lowest point. With emergency funds depleted from her late brother's funeral expenses, Brown was at a loss for the \$10,000 cost to demolish her home.

"I came out of the house with nothing but the

clothes on my back," she said. "I couldn't even save my dog."

Before this tragedy, she had already been through her share of trials and tribulations.

In December 2017, Brown's mother passed away from cancer and, 16 days later, her daughter died of complications related to type 1 diabetes.

Among other Georgia College graduates in the family, Brown's daughter graduated with a bachelor's in psychology and practiced in the field until she was 44 years old.

"We really are a Georgia College household," Brown said.

She was introduced to CHSI Director Dr. Damian Francis through her church. And as part of their Community University Partnerships to Reduce Health and Social Disparities project, CHSI members decided they should step in.

"Brown's situation was brought to my attention at a local community meeting for the Hardwick Community Collaborative by members of the community," Francis said. "They were reluctant to approach the county due to waning community trust in local government. However, the CHSI was able to bridge the gap between county and community and is working steadily to grow community trust in both Georgia College and government partners."

Because of that work, Brown paid only \$10 for a county demolition permit. The center now plans to assist Brown by seeking support to aid in the building of a new home.

Now staying with a neighbor, Brown is waiting on redevelopment of her plot of land.

"With a place of my own, I can see my three boys, my grandbabies," she said. "I love my community. They brought me back and keep me moving."

Did you know?



The holiday display at Georgia's Old Governor's Mansion has been recognized by foxnews.com in their feature "Christmas tree displays across America that are larger than life."

The Mansion was listed as one of the 10 must see displays from around the country.

Others included the Kauai Festival of Lights in Lihue, Kauai, Hawaii, Candy Land Christmas in Johnson City, Tennessee, and LEGO Christmas Tree at LEGOLAND California in Carlsbad, California.

The Nutcracker returns for 25th year at GC

Georgia College celebrates its 25th Annual production of the cherished classic ballet, "The Nutcracker," Friday and Saturday, Dec. 10-11, and Sunday, Dec. 12, in Russell Auditorium.

Some dancers, a mix of college and high school students, have danced in Georgia College's "Nutcracker" every year since age 3.

"I directed the first 'Nutcracker' 25 years ago on our campus, and we only had about 40 dancers," said Amelia Pelton, director of dance at Georgia College. "We're now in our second generation. Some children have parents who danced in 'The Nutcracker.' I look forward to this all year and plan it year-round! It is my joy."

The 1892 Russian ballet has become a staple in many celebrations of Christmas. The fairytale two-act play follows the holiday festivities of a family, and a young girl who dreams of a handsome Nutcracker waging battle on an evil Mouse King.

About 240 dancers ages 3 to adult are in the production, including 120 from Baldwin County elementary schools. Audiences will marvel at special effects like falling snow, a 24-foot dancing dragon, magic tricks and more.

Shows are at 7 p.m. Dec. 10-11 and 2 p.m. Dec. 12. Tickets are available online at gcsutickets.com and at the door. Cost is \$15 for general admission; \$10 for seniors, GC faculty, staff and non-GC students; and \$5 for GC students. For more information, please call 478-445-8290.



What's going on in Bobcat Territory?

Visit frontpage.gcsu.edu/calendar

Tuesday	Wednesday	Thursday	Friday	Saturday
7	8 1:30 p.m.- Georgia College's Max Noah Singers will perform a brief holiday concert at Georgia's Old Governor's Mansion. The concert will showcase a cappella songs and songs with piano, violin and double bass.	9	10 6:30 P.M.- Come get your picture taken with Santa in front of the Mansion Christmas tree. Tickets are \$40.00/family, and include 5 minutes with Santa and Mrs. Claus, a photo taken with Santa, a walking tour of the main level of the Mansion, and hot chocolate, cookies, and a 19th-century ornament craft in our Education Building. To purchase your tickets and reserve your spot, please call 478-445-4545 or email haley.stodart@gcsu.edu 7 p.m.- 25th Annual production of the cherished classic ballet, "The Nutcracker," in Russell Auditorium.	11 1 p.m.- Georgia College hosts its December Commencement Ceremony at Centennial Center. 6 and 7 p.m.- Join us for our annual Candlelight Tours at Georgia's Old Governor's Mansion. Please call 478-445-4545 or email haley.stodart@gmail.com to reserve tickets. 7 p.m.- 25th Annual production of the cherished classic ballet, "The Nutcracker," in Russell Auditorium.