

# THE MCSP TIMES



## Message from the Chair



Welcome to the 2023 MCSP Department newsletter! We are a department in search of a new name, as starting with our namesake programs of **M**athematics, **C**omputer science, **S**tatistics, and **P**hysics we have added programs in Actuarial science, Data science, Engineering science, and Sports analytics. Any suggestions for a new name would be welcome. (We are too humble to go with Group of Awesome People.)

This newsletter has a few different goals. One is to review some of the department's accomplishments in the past year. Although we're still recovering from COVID disruption, we have much to be proud of. A second goal is to highlight some of our favorite students. This sampling of students represents the many great students who make our job rewarding. A third goal is to indicate some of the areas in which we could use some help. Our ambitions always exceed our resources, and we hope that you will join us to form new collaborations that will expand our ability to make a difference in students' lives.

You will find two recurring themes in the student profiles. One is the value of the student research projects that many of our majors complete. The independence and the challenge of open-ended projects force students to raise their game to a new level. Such projects look good on their resume, but the biggest benefit is the confidence obtained by succeeding outside of typical school settings. A second theme is the students' appreciation of the MCSP culture. In the department teas, and picnics, and conversations in the hallway, students and faculty can truly connect in important ways.

One of the outcomes of this past hectic year is confirmation that the MCSP Department is ahead of the curve on program development and innovation. The new programs outlined in the opening paragraph have brought in some students who would not have looked at Roanoke otherwise, and have highlighted the innovation and forward-looking development that have always characterized our work. Some of our new programs are going through the growing pains that are typical, but we think they are well designed to make important contributions to the Roanoke College of the future. We would greatly appreciate your help in bringing our programs and students to the highest level possible.

### Inside this issue:

Message from the Chair	1
Student Profile: Lilly Blair	2
Student Profile: Jacob Bonzon	3
Student Profile: Katie Charbonneau	4
Student Profile: Levi Johnson	5
Student Profile: Brayley Whitcomb	6
Student Profile: James Rowe	7
Student Profile: Bobby Hoyer	8
Student Profile: Selam Mekonnen	9

### Editors:

Dr. Roland Minton  
MCSP Department  
Trexler Hall, Room 270-C  
540-375-2358  
Minton@roanoke.edu

Laura Bair  
Trexler Hall, Room 270

*Dr. Roland Minton*

## Actuarial Science

**Program News.** Roanoke College has partnered with HipaWare, a local firm created by Alecia Nash, that provides a full range of services for self-insurance professionals. We hope to create a regular pipeline of actuarial science majors doing internships with HipaWare, both in the summer and during the school year. The students will gain valuable experience in underwriting at a level of detail that can launch them into actuarial positions. Because HipaWare communicates with a wide range of companies, students will also have outstanding networking opportunities and an understanding of the insurance business as a whole. Alecia is well known to the mathematics faculty through her French horn playing, connecting with oboist Maggie Rahmoeller, and Roanoke area trivia nights with Hannah Robbins and others. Lilly Blair, profiled below, is interning with Alecia in spring 2023.



**Student Profile.** Lilly Blair is a senior from Salem, Virginia, majoring in Actuarial Science. She graduated last year as valedictorian with majors in Mathematics and Economics. In 2022, Lilly was named ODAC Offensive Player of the Year in lacrosse, and was named a First Team Academic All-American. She joins her older sister Emma as winners of the Senior Scholar in Actuarial Science award. Lilly's parents Tommy and Kim are RC alums and hold important positions at the college, so Lilly grew up on the RC campus. Her strong sense of family is exhibited by her choice of number 7 for her lacrosse jersey; parents and 4 siblings make a family of 7. Lilly identifies maintaining a 4.0 and completing research projects in economics and actuarial science as among her greatest accomplishments. One of her favorite moments at Roanoke was a second half run of 8 goals by the women's lacrosse team to break open a tie game against Shenandoah in the 2021 ODAC semifinals. It was a home game with a large crowd, and the energy from the crowd and the team's strong play created a magical synergy. You can read more about Lilly at <http://mcsp.pages.roanoke.edu/magnificent-seven/>.

**Program Needs.** An important qualification for obtaining a job as an actuary is passing the tests run by the Society of Actuaries and the Casualty Actuarial Society. Eric Lee graduated from Roanoke with three exams passed, leading to an excellent job as an actuary with Geico. Eric estimates that he spent about 100 hours studying for each test. This preparation time could be reduced if the college offered a "study course" of some sort. Having faculty-led study sessions, in conjunction with one of the many online prep programs, would help focus and coordinate student study programs. Endowing a fund for faculty stipends can make this happen!

## Physics

**Program News.** The Roanoke College chapter of the Society of Physics Students (SPS) has won an Outstanding Chapter Award from the SPS National Office. The honor recognizes chapters for their excellence as top-tier, student-led physical sciences organizations. The Outstanding Chapter Award recognizes high levels of outreach as well as unique approaches to fulfilling the mission of SPS to “help students transform themselves into contributing members of the professional community.” See [https://www.roanoke.edu/about/news/physics\\_recognition](https://www.roanoke.edu/about/news/physics_recognition) for more. Among other activities, the Roanoke chapter performed a physics-themed play (“Constellations”) in coordination with Nelson Barre from the Theatre Group in the Fine Arts Department, and conducted outreach events at West Salem Elementary School.



**Student Profile.** Jacob Bonzon is a senior from Markham, Ontario, Canada, majoring in Physics and Mathematics. He is a starter and one of the leading hitters on the RC baseball team. He came to Roanoke because of the combination of a good baseball team, good liberal arts college, and a strong STEM program. Jacob’s accomplishments include awards from the physics faculty as one of the top first year students, book-ended with induction to Sigma Pi Sigma, the Physics honor society. He has also been inducted into Pi Mu Epsilon, the Mathematics honor society. His favorite moments at RC include both athletic and academic moments. In the 2022 baseball conference semifinals, Jacob scored the winning run in the 10<sup>th</sup> inning to eliminate Lynchburg, the #5 team in the country. The previous fall, he was part of the engineering design class trying to get a converted pinball machine to squirt streams of water to illustrate river watersheds. At two in the morning, it worked for the first time, which was a thrill since their final presentation was later that afternoon! Jacob is part of a talented group of Physics students who have persevered through COVID and the departure of two senior Physics faculty. In spite of this, he has developed great skills and is ready for a job in engineering or data analytics.

**Program Needs.** Equipment is always needed to keep Physics facilities up-to-date. We are fortunate to have received a generous donation to upgrade telescopes. Another area of perpetual need is computer equipment to do the computational work that, for example, Dan Robb and his students perform. Funds for a cluster would make a significant contribution. Going in a visual direction, various courses and faculty in Physics and Engineering could make use of high-speed photography and virtual reality gear. In the past, we have used a very low-resolution video to compare the motion of a rubber band to the mathematical solution that Fourier series gives. Slow-motion video and virtual reality can let students see the properties of complicated solutions and can motivate further experiments.

## Mathematics



**Program News.** It is our policy to say that mathematics is everywhere in the world. We have several examples of that with our students and faculty. Senior Katie Charbonneau was named the first Fowler Scholar, a summer research program rewarding excellent student policy research. On the faculty side, Karin Saoub was in Washington D.C. as a Science & Technology Policy fellow consulting with the Director of Science for the Department of Energy. You can read more about this fantastic experience at [https://www.roanoke.edu/about/news/saoub\\_aaas\\_fellowship](https://www.roanoke.edu/about/news/saoub_aaas_fellowship). Dave Taylor has been doing great work in the Dean's Office and for the Institute for Policy and Opinion Research. He is co-editor of an award-winning book featured at [https://www.roanoke.edu/about/news/dave\\_taylor\\_book\\_award](https://www.roanoke.edu/about/news/dave_taylor_book_award).

**Student Profile.** Katie Charbonneau is a senior from Fairfax, Virginia, majoring in Mathematics and International Relations. Katie first encountered Roanoke College as a "pit stop" on the way to Virginia Tech, where her parents had gone to college. The Honors Program and small size were attractive to her. Katie has kept busy with two diverse majors, Honors classes, and a wide range of outdoor adventures. She is especially fond of caving, with the New River Cave her favorite. This cave is relatively spacious and long, and has a healthy bat colony. The MCSP tea and picnic, and the President's Balls are on her list of favorite on-campus events. Among her many academic honors are Phi Beta Kappa, being vice-president of Omicron Delta Kappa, and Senior Scholar in Mathematics. She jokingly cites acing Real Analysis as her greatest academic achievement, but quickly amends that to being named the first Fowler Scholar at Roanoke College (see [https://www.roanoke.edu/about/news/fowler\\_scholar](https://www.roanoke.edu/about/news/fowler_scholar)). Katie did a multi-semester project bridging her majors of International Relations and Mathematics. She created a massive data set of characteristics of countries throughout history, with the goal of using machine learning techniques to predict conflict. The variables with predictive power ended up being type of government, the status of neighbors having conflicts inside or outside of their borders, and measures of wealth inequities. The data set will allow other students to extend her analysis, as Katie heads to mathematics graduate school next year.

**Program Needs.** Mathematics is not typically an expensive discipline; give us a place to write and think and we can be happy. However, taking students to conferences can be expensive. We would like to set up an endowed student travel award to fund a top student to present research at national and international meetings. In the past, our students have been very successful presenting their work at national meetings like MathFest and the Joint Mathematics Meetings, run by the Mathematical Association of America. A competition to fund top students would elevate the status of travel and conference participation.



## Computer Science

**Program News.** Every computer science graduate completes a senior project. We had 13 graduates last year and are looking at 11 for this year. The quality and diversity of topics for the projects are impressive, especially from a program with only three faculty members. This year, Levi Johnson (see below) presented his work along with Davis Tingle, whose project looked at finding efficient routes for drone delivery. Coming up are Reece Reynolds' presentation on the use of machine learning techniques to analyze lacrosse statistics and Luke Elder's presentation on machine learning to analyze dielectric properties. They are going to be good!

**Student Profile.** Levi Johnson is a senior from Wirtz, Virginia, majoring in Compute Science and Mathematics. Levi's Mom Kim is a Roanoke graduate in Computer Science. Pictures of Levi's and Kim's research projects are adjacent in the second-floor independent study gallery. Levi came to the college with a special interest in web development, and coursework and IT work have strengthened that as a career choice. He is actively looking for a web development job after graduation. With his experience and math skills, good jobs should be forthcoming, unless his habit of wearing a Manchester United jacket rubs somebody's Arsenal the wrong way. His favorite academic achievement was his computer science project for the Forest Service. He was part of a long-term project to develop an interactive virtual reality training program for fire fighters. Levi's role included researching previous work. He made impressive progress on a project that will continue to build on his foundation. He enjoyed being a part of something bigger than a one-semester exploration. Levi's favorite events at Roanoke College include the MCSP tea, an informal weekly get-together at which students and faculty play games and chat and, occasionally, drink tea. Casino Night with the Board Game Club and the MCSP picnic are other favorite events at which students and faculty enjoy time together.



**Program Needs.** We are always interested in new software subscriptions, but a different need that could be addressed is projects for students to work on. The collaboration that Anil Shende has started with the Forest Service has given several students, including Levi Johnson, excellent project ideas. Other collaborations would be welcome. Our computer science students are well trained in current practices and often have experience working for IT. There are many projects, involving programming or not, that they are ready to join. Get in touch with us if we can help you!

## Statistics

**Program News.** The statistics program at Roanoke College has always performed above its weight. Although we have never had a major, numerous students have gone successfully to graduate school and a handful have become statistics professors! Jake Beardsley '22 is in the sports analytics program at Virginia Tech, and thriving in a program populated with students who have already earned a Master's degree. The statistics concentration will graduate a record 10 students this year. One of them, Marcus Cooper, will enter the Master's business analytics program at Wake Forest. At the faculty level, Adam Childers continues to improve Classroom Stats, an app for interactive data collection in statistics classes that he developed with Dave Taylor. It is used internationally by thousands of students.



**Student Profile.** Brayley Whitcomb is a senior from Salem, Virginia, majoring in Mathematics with a concentration in Statistics. Growing up in Salem, she had always thought about coming to Roanoke College. She has a perfect 4.0 grade average, a testament to her intelligence and work ethic. I learned to be extra careful about which textbook problems I suggested that students look at, because if there was a stinker in the bunch Brayley would ask about it. Fortunately, she was usually kind enough to do this in office hours and not embarrass me in class. One of her top achievements during her time at Roanoke was being selected for a mathematics internship with the Department of Defense. Along with navigating a confusing sequence of background checks and interviews, she had to deal with the on-again, off-again status of internships coming out of COVID. The interviews can be challenging, so Brayley says that to be “found academically suitable, as well as morally, was a huge deal for me.” One of her favorite moments at Roanoke College occurred in Applied Differential Equations. A Mathematica simulation that the class looked at was especially cool and the entire class geeked out. She says, “It was one of the nerdiest things I've ever been a part of, but it was awesome because it felt like I had found my people.” You are definitely one of us, Brayley!

**Program Needs.** The needs for a small overachieving program will always include time and money. Both can be met by helpful collaborations with outside agencies. If you have projects that our students could contribute to, our students are ready to help you. Data sets that students could work on are pure gold for a statistics program. The college's Stat Crew generates sports data that seed numerous student projects. Non-sports data would be appreciated by many students! The desired conclusion of student research is to have the student present the work at a national conference. An endowed travel scholarship would be a fantastic contribution to the program.

## Sports Analytics

**Program News.** The Sports Analytics concentration at Roanoke College is closely tied to Stat Crew, a student group that collects data and sends reports to the Roanoke coaches. Stat Crew worked home games for men's and women's soccer and basketball games, plus baseball and the first season of men's volleyball. Baseball reports are sent not only to the coaches and players but also to the ODAC office, which uses balls and strikes charts to help improve umpire accuracy. Roanoke games are assigned the top umpires because of the availability of these reports! A highlight of the year was the success of our team in a national sports analytics competition, discussed below.



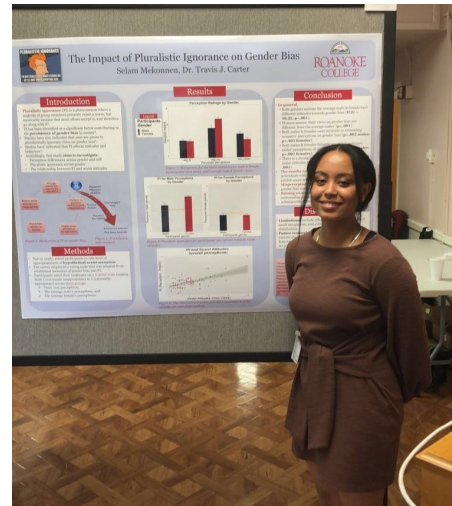
**Student Profile.** James Rowe is a senior from Charlotte, North Carolina, majoring in Sport Management. As a transfer student, time was too short for James to fit in the full Sports Analytics concentration in a few semesters, but he earned his analytics chops by competing in the National Collegiate Sports Analytics Championship. James finished 14<sup>th</sup> nationally in qualifying, and performed well in the national finals, helping Roanoke to a second place finish (see <https://cardinalnews.org/2023/03/08/roanoke-college-team-comes-close-to-a-national-title-in-sports-analytics> for more). James came to Roanoke after visiting campus as an afterthought following a trip to Shenandoah. He lists his and the team's strong performance in the sports analytics championship as his biggest achievement. He says, "Coming in as a small D3 school versus a lot of the big dogs and placing 2<sup>nd</sup> felt like a real accomplishment." It is indeed, and is a testament to his communication skills and strong work ethic. James organized the team, arranged for some practice sessions, applied for and was awarded student travel scholarships, and was generally the team leader. With this competition and internships with the local professional hockey and baseball teams, James has an unusual amount of experience in analytics to go with impressive communication and leadership skills. When he gets his chance, he will be very successful in the sports business.

### Program Needs.

The incredible TrackMan data that Stat Crew had access to in 2023 is due to a generous contribution from RC alum Tod Senne. We are very grateful, Tod! The Salem Red Sox are switching to a different technology, Hawkeye, and it is unclear what access we might have to TrackMan or Hawkeye next year. Stat Crew also provides reports for soccer (see the CardinalNews article above) and basketball, and we are adding volleyball to the mix. Students get paid to collect data at games, and funding a program for these payments would be much appreciated. The baseball data is our biggest current subscription need, but purchasing TrackMan for the golf team would be a huge help for that sport.

## Data Science

**Program News.** The data science program is just getting started. The promise of the program can be seen in Selam Mekonnen's performance in a national sports analytics competition. Although Selam is admittedly not a basketball fan, she was able to parlay her programming skills and graphics abilities into a spot in the national Sweet Sixteen of this competition. The competitors were given a large data set of basketball play-by-play data and asked to find something interesting. In five hours. Identifying patterns in the data, creating effective visualizations, and telling a clear story are all data science skills that enabled Selam to excel, despite being a bit unclear on the subtleties of the pick-and-roll.



**Student Profile.** Selam Mekonnen is a senior from Germany, majoring in Data Science with a minor in Psychology and concentrations in Statistics and Sports Analytics. Selam has lived in numerous countries, with much of her schooling in Germany and Ethiopia. She found Roanoke College through a family member from Virginia, and was attracted to the campus, the majors being offered, and the financial aid she was awarded. Selam was able to land two data analytics internships. One was with AMDEX corporation in Rockville, Maryland. She worked on projects from the Department of Labor, assisting a team of people by processing and analyzing data. The second internship is remote work with the analytics department of National STEM Honor Society, focusing on social media data. Selam is using web scraping and word stemming along with machine learning models to identify which aspects of their LinkedIn presence increase visitor engagement. As alluded to above, Selam was one of the three team members who earned second place team honors for Roanoke at the National Collegiate Sports Analytics Championship (see <https://cardinalnews.org/2023/03/08/roanoke-college-team-comes-close-to-a-national-title-in-sports-analytics> for more). One of her favorite moments at the college was being a part of the winning team for this year's Darwin Days scavenger hunt. The process of gathering items and acting out scenes was fun and an unforgettable experience.

**Program Needs.** Befitting a program that draws on both computer science and statistics, collaborations with businesses with data sets to analyze are a priority. Through internships and class projects, Roanoke students and prospective clients can benefit greatly from partnerships. Roanoke students' proficiency in programming combined with excellent communication skills enhanced by a course in data visualization make them excellent problem solvers. Get in touch with us if we can help you!



## Engineering

**Program News.** The newest of our new programs is slowly developing. We have hired our first tenure track professor, and are excited to see what Bryan Cobb brings to Roanoke. His research is in biomechanics. Specifically, he uses force plates to identify running characteristics that can be used to improve running efficiency. Bryan will be working hard to develop courses, connect with majors, and guide the program to accreditation. His research has great potential to attract students to Roanoke, to connect with Exercise Science faculty at Roanoke, and to make connections with the hiking and running communities in the Valley.



**Student Profile.** Bobby Hoyer is a rising senior from Fair Haven, New Jersey, officially majoring in Physics. His intention has always been to utilize the Dual Degree program connecting Roanoke College with Virginia Tech engineering. He came to Roanoke partly because of that option, partly because of the college's Honors program, and partly because of a strong recruiting pitch. Bobby has completed an excellent research project doing simulations of materials that have emerged as inexpensive and efficient bases for solar panels. He presented his work at a national conference over spring break, and was named a top presenter! Another academic highlight at Roanoke came in his sophomore-level Engineering Design class. Working on a team, he carried the spark of an idea of using an old pinball machine to illustrate water basins into the creation of a budget, purchase of raw materials, and the assembly of the final product. See Jacob Bonzon's memory above of the dramatic conclusion of this story. A different Roanoke class was a highlight for Bobby for different reasons. An Honors class met with prisoners to examine peacemaking and religion. The deep discussions highlighted for Bobby the similarities among people from very different circumstances, and brought him to some profound ideas about what defines human beings. If Bobby doesn't seem to fit your stereotype of an engineer, we think he is exactly the type of person we hope that the Engineering Science program produces.

### Program Needs.

Our needs are lab equipment, and more lab equipment. The new courses being developed run demonstrations, have hands-on activities for the students, and have student projects that can be showcased. While students like Bobby Hoyer and Jacob Bonzon can turn a pinball machine into an interactive educational display, equipment to measure stresses on structures and to construct soil erosion experiments are needed to make the program widely accessible and visually appealing. As the program develops, equipment needs will become specific, but at the moment an enhanced equipment budget for engineering would help move us forward.

# MCSP in the News!

