

UMKC RooMath News

Program of Mathematics & Statistics Newsletter
<https://sse.umkc.edu/academics/programs/mathematics-and-statistics.html>

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Mathematics, Statistics, and Computer Science Form a New Division to Promote Collaborations



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From the CAM Division Associate Director
Dr. Majid Bani-Yaghoub,

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It is my pleasure and great privilege to present to you the new edition of **RooMath News**. Perhaps, the biggest news is that the mathematics and statistics, and computer science departments formed a new division in the new UMKC School of Science and Engineering. The Division of Computing, Analytics and Mathematics (CAM) is one of four divisions of the school, and it has the highest

number of students. I am confident that by working together, we will be stronger than before. The new division will facilitate collaboration between CAM faculty and will introduce a new curriculum map, which will make the dual major in computer science and mathematics and statistics feasible. Students majoring in both disciplines can develop a deeper understanding of abstract mathematical concepts and therefore enhance their computational thinking skills to accurately find real-world solutions. The RooMath News will keep the tradition of

delivering news related to math and stat faculty and students even in our new Division.

As you read this newsletter which contains various articles, announcements, and pictures of old and new friends, you will notice the excellent work of our faculty and students during the academic year 2021-2022. Our department hosted the MAA Missouri Section meeting on Friday April 8 and Saturday April 9, 2022. Hosting this conference has increased our visibility in

Missouri. The UMKC Math Competition team took 5th place in the 27th Missouri Collegiate Mathematics Competition, which is a prestigious math competition in Missouri. Several math majors participated in undergraduate research or summer internships. Many students graduated and found jobs as an actuary, data analyst, high school teacher, etc. We hope that you enjoy reading this newsletter.

The UMKC Math Competition Team Took 5th place in Missouri

The [Missouri Collegiate Mathematics Competition](#) is a team event open to any college or university in the state of Missouri, which can send up to two official teams of one to three undergraduates each to compete. The contest consists of challenging mathematical problems, comparable to but not quite as difficult as those on the Putnam Exam. Some partial credit may be earned for substantially correct work toward a solution to the problem.

This year, the UMKC Math Competition Team took 5th place in the 27th Missouri Collegiate Mathematics Competition, after working together for two semesters. **Dr. Bani** coached the team and the students were extremely self-motivated. As shown in the bottom picture standing from left to right, the team members are **Michael Bai** (Computer Science Major), **Allyson Jenkins** (Mathematics Major) and **Tarrant Chandler** (Physics Major). Congratulations on your great achievement!



Top: Picture of all participants of the 2022 [Missouri Collegiate Mathematics Competition](#)



Middle and bottom: UMKC Math Competition Team standing from left to right: **Michael Bai** (Computer Science Major), **Allyson Jenkins** (Mathematics Major) and **Tarrant Chandler** (Physics Major)



UMKC math majors are preparing for 2022 Putnam Competition

The **William Lowell Putnam Competition** is a national mathematics contest for college students. Each year on the first Saturday in December, over 2,000 students spend six hours (in two sittings) trying to solve 12 problems. You can try some problems in your free time from <https://kskedlaya.org/putnam-archive/>. Please contact the president of the UMKC Math Club, Dylan Hood, ddhtcm@mail.umkc.edu, if you are interested in participating in the Putnam competition.



William Lowell
PUTNAM
Mathematical Competition

Math major Brittany Longwell works an internship at Lockton Companies

In my internship I have processed payments and transactions sent to Lockton Companies on our 'Client Payment Table'. I analyze and review reports and data to find the accurate invoice numbers for the payments and transactions sent. If I am unable to find the invoice number, I have to do research and analyze the account and the payment to figure out what the invoice number is. I may have to email the client and wait for their reply before moving it over. Sometimes I have to analyze previous payments from specific accounts to check if the payments and transactions are accurate and if the payments got moved over to the right table.

Another part of my internship was trying to figure out why payments didn't process through after we found the invoice number. So, I had to go and look at those payments and do an analysis of why they did not process through our system. Sometimes it is a simple fix, other times we have to take a deeper look research the invoice numbers that didn't process and look in our database to figure out what is wrong with the invoice number. Most of the time, the invoice number was just slightly off, or it was not in our system yet. Overall, I loved the internship and being able to learn a new skill set. Lockton is trying to create a role for me where I would have a career in both Data Analytics and what I do in this internship.

Questions:

Could you tell us how you obtained the internship and how many other internships you applied for?



I first started working for Lockton in August of 2021 as an HR intern. By mid to end of October, I realized I needed a few extra credits to graduate in May of 2022. I started applying around for Data Analytics internships and I was unable to find anything because it was too late into the year. I would say I probably applied for about 10 internships and didn't hear anything. So I started talking to co-workers within my company and trying to figure out something, and that is when I came upon my **Accounts Receivable Internship**. I had an intro interview with the recruiter and then an interview with the manager over the department for Accounting. After I had that interview in November, I was able to obtain the internship and started training right away.

Did you have any help from UMKC career services and other resources to create and revise your resume?

No, I did not have any help from UMKC career services. I was scheduled to go to the career fair in February but I was unable to make it due to personal reasons. However, I did have a friend of mine who is an engineer help me fix up my resume and work on an outline for a cover letter for any job I applied for after college in Data Analytics.

What kind of questions can we expect in an internship interview?

In my internship interview, I got asked:

Tell me about yourself.

Why do you think you are the best fit hire for this position?

What previous experience if any do you have with this role?

What courses have you taken?

How many hours do I want/need to work?

Why did I major in mathematics and statistics?

Name a few specific skills needed for a math or stat internship

For my Accounts Receivable internship, I needed knowledge in Microsoft Office programs (Excel, Word), the ability to analyze different accounts and payments and figure out if they are on the Client Payment side or need to be moved to P&C side, and look at previous statistics of those payments and figure out if that account is successful in making their payments.

Tell us about the company that you worked for and its clients?

Lockton Companies is a large private insurance brokerage firm that has many different locations across the United States. Lockton hires almost every kind of career field or degree, they have everything from business to marketing to sales to accounting to data analytics to actuary science and so much more. Clients within Lockton from around the world rely on the company for risk management, casualty benefits, and retirement benefits.

What are the career expectations and characteristics of your internship?

Expectations for this internship included being online everyday for 3-4 hours a day, processing payments from clients on the

payment table, doing research and analyzing payments and accounts to find invoice numbers for payments, asking for help if not sure how to do something, and emailing or calling the client if you can't find the invoice number after exhausting all the methods of finding invoice numbers. My internship was very hands-off from the management, meaning I got to work from home and set my own hours each day and didn't have to be in contact with my manager every day.

Where and how did you use mathematics or statistics in your internship?

Within my internship, I had to process a lot of payments and move them all over off of our Client Payment table. So, I dealt a lot with numbers with strong attention to detail to not process the wrong amount on the payment. I would say I processed over 50 transactions a day at least. Sometimes I would have to do research to find the invoice number from the client. So I would have to first look through 2 separate reports, then look into a Client Payment mailbox, and if I was still unable to find the invoice number, I would have to research the account and analyze previous payments to find the new invoice number for the payment. Also, I would have to analyze trends of previous payments and make sure that the payments were sent to the right department.

What math or stat skill would you like to learn to be better at your internship?

I would really like to learn more about different software and coding programs. For example, SQL Server, Excel, Python, R, and etc. More specifically, SQL and Excel. Since my passion is in Data Analytics, I really want to be the best that I can be at coding and using those programs so I can be a successful Data Analyst for any company.

Tell us about your supervisors and their roles in training and preparing you for your future career.

I work within the accounting department, so my manager is Michelle Tidwell, a Client Receivables Manager and she is the one that hired me. However, Garrett Gail, who is an Accounting Specialist, is the person who trained me on the job and made sure I was successful and knew all the necessary skills. She was the one I would report to if I ever had questions or didn't know how to do something. Both, Michelle Tidwell and Garrett Gail have helped me find a career in my degree field after college. They have talked to people within Lockton and are actually trying to create a role for me that would be a hybrid role of Data Analytics and an Accounts Receivable Analyst.

Do you consider the same company and job as a future career?

Lockton Companies has been one of my favorite places that I have worked for. So, in early January I contacted two separate hiring recruiters within the company to figure out what career opportunities would be available to me. I kept in touch with both of them throughout the semester, and because of that I am able to say that I will have a future within Lockton Companies.

What are the most satisfying and most frustrating parts of your job as an intern?

The most satisfying part of my internship was being able to learn new skills and how to be a Accounts Receivable Analyst and working in a real world job. I love being able to just learn new things and be the best that I can be at whatever it may be. Working in a corporate company, I think you really figure out what a future career would look like. Another satisfying part was knowing I am doing a career that uses my degree in math and stats and advances those skills. The most frustrating part is that I wish this internship was more in Data Analytics so I was gaining experience in the related field, so it is easier to find a career after college.

In what ways, have you benefited from having this experience?

From this experience, I have learned to have better time management skills with balancing schoolwork and my internship. I took 17 credit hours over the spring semester and also had the internship where I needed to be online 15-20 hours a week. I gained college credit from this internship that I needed to graduate and learned how to be more focused and more attentive in detail in my work. Working remotely is truly the greatest and worst thing because it was great to have the flexibility to work whenever and wherever while I was still in college, however it is harder to focus to keep doing work when you are at home with all the distractions. Working remotely, I learned how to be able to shut everything off and truly be focused in what I needed to do daily for my internship. Another huge thing was being able to learn a new role and gain more work experience to help my resume when applying for jobs.

What advice would you give to other Math and Stat majors who will serve as an intern?

My advice to any future Math and Stat major interns is to get an internship prior to your senior year of college (summer between Junior year and Senior year), apply to a lot of internships, create a good cover letter that outlines all of your skills and make it clear why you would be an asset to their company (what makes you stand out compared to other candidates), take classes in college related to whatever career field you want to pursue, and have a good resume. I think one of the most important things when applying to internships or any career is to have a good resume, a cover letter outlining why you are the perfect fit for the role, and build that experience for any skills that are needed for a future job. For example, a Data Analyst might want to get training in **Excel, SQL, Python, R**, and all other coding and software programs. The main thing with any career is they want prior experience. Lastly, apply to a lot of internships, you may not get the first one that you apply for and it is very important to apply to a lot of different ones. Also, I would go through a few interviews and figure out what role is best for you, your skillset, and for what you want in a future career.

Tell us about your math and stat undergraduate degree.

I am going for a B.S. in Mathematics and Statistics with a minor

in Actuarial Science. I wanted to minor in Data Analytics, but it was not a minor at the time when I had to pick. To this point, I have taken Calculus I, Calculus II, Calculus III, Linear Algebra, Sets and Proof, Differential Equations, Mathematics Stats I, Mathematics Stats II, Advanced Analysis, Math writing intensive course, Numerical Analysis, and Abstract Algebra. My favorite classes were Linear Algebra, Differential Equations, and Calculus I and III.

Why did you choose mathematics and statistics?

I chose mathematics and statistics as my degree because I love the challenge of solving problems and brainstorming ways to solve difficult problems. Ever since I was a kid, I loved mathematics. In middle school, my favorite classes were Algebra and Algebra II. Being able to solve functions and equations, create graphs and models, factoring equations, and solve linear systems were some of my favorite things about those courses. Then, when I got to college I started taking College Algebra and moved onto Calculus I, Calculus II, Calculus III. And each of those classes brought their own separate challenges and I loved that. I would say the main thing I like is the challenge of seeing a complicated math problem and figuring out a way to solve it.

Who or what inspired you to become a stat graduate student?

I haven't decided to pursue a master's degree.

If you were not a Math and Stat major, you would be...?

Prior to choosing mathematics as my degree, I switched from mechanical engineering to business administration to accounting. So, if I was not a math major, I would either major in Business, Finance, or Mechanical Engineering. All of the majors provide their own challenges; what I love about mathematics is solving new problems.

Tell us about the Math and Stat professors at UMKC.

Over the course of my time at UMKC, I have had several different Mathematics professors every semester. But, every semester (except summers), I have had **Dr. Richard Delaware** as a professor from Calculus 2 to Sets and Proof to Advanced Analysis to my Math writing course. Dr. Delaware teaches very challenging classes, but he always makes sure that all students understand the material and writes out very legible notes. He is also very helpful in his office hours and is very willing to meet outside of his office hours, if necessary. Some other Math and Stats professors I have had include: **Dr. Liana Segal, Dr. Zeng, Dr. Bani, Dr. McCoy**, and a few other ones. Personally, I don't have any complaints about any of the math professors, they have all been super helpful and really care about students getting the material.

Where do you see yourself in the next 5 years?

Professionally, in the next 5 years, I would love to be a **Senior Data Analyst** at a company, hopefully Lockton. I would also like to take my two Actuary exams so I will have more in my skill set and possibly explore that career as well. This summer, I am going to take training classes and obtain a Data Analyst Certificate.

I would get training in SQL, Excel, Python, and R. In my personal life, I would like to be able to own my own house and be married.

What do you enjoy doing in your spare time?

In my spare time, I like to write, cook, be outdoors, and take my dog on walks.

Congratulations to Recent Math and Stat Graduates

The Department of Mathematics and Statistics congratulates the following recent graduates with a bachelor’s, master’s or PhD degree in mathematics or statistics. In Academic Year 2021-2022, a total of 35 Math & Stat degrees were awarded including 22 graduate degrees.

Fall 2021

Sahib	Hasan	Mathematics Co-iPHD
Mofareh	Ghazwani	Mathematics Co-iPHD
Eric	Hogue	Statistics MS
Yousef	Alharbi	Statistics MS
Silvana	Docaj	Statistics MS
Chen	Chen	Statistics MS
Stefani	Mitchell	Statistics MS
William	Ford	Statistics MS
Richard	Schneider	Mathematics & Statistics BS
Dexter	Wickham	Mathematics & Statistics BA
Harrison	Terry	Mathematics & Statistics BS
Emily	Dutcher	Mathematics & Statistics BS
Brett	Nelson	Mathematics & Statistics BS

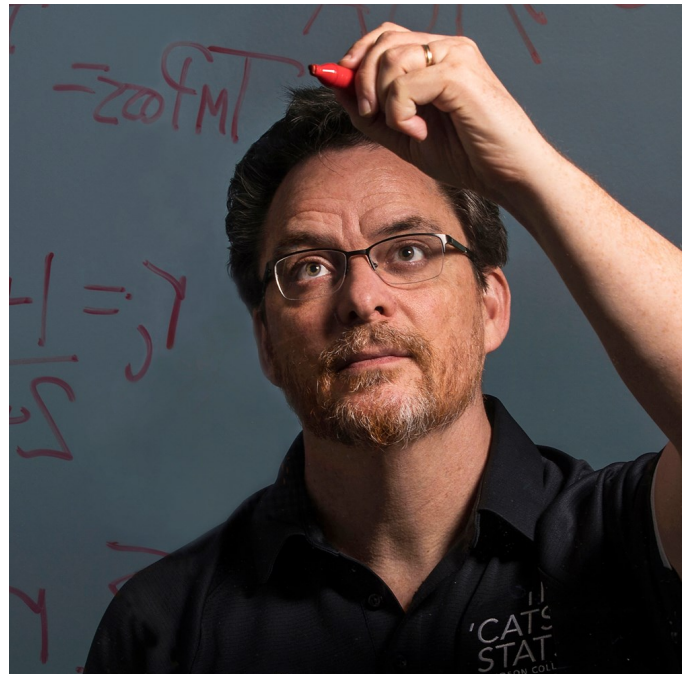
Spring/Summer 2022

Liudmila	Malyshava	Mathematics Co-iPHD
Tariq	Alharby	Mathematics Co-iPHD
Rohit	Saini	Mathematics Co-iPHD
Hadeel	Alqadi	Mathematics iPhD
Azzah	Alshekhi	Mathematics iPhD
Dilek	Soysal	Mathematics iPhD
Braeden	Vaughn	Mathematics MS
Jacob	Wheeler	Statistics MS
Jacob	Salas	Statistics MS
Loubna	Ouaret	Statistics MS
Fatima	Alenezy	Statistics MS
Hyosoon	Lee	Statistics MS
Nicole	Stovall	Statistics MS
Demetrius	Taylor	Statistics MS
Olivia	Rippee	Biology & Chemistry & Math & Stat BS
Jacob	Wingert	Mathematics & Statistics BA
Brittany	Longwell	Mathematics & Statistics BS
Cole	Flackmiller	Mathematics & Statistics BS
Joel	Busch	Mathematics & Statistics BS
Alison	Hatfield	Mathematics & Statistics BS
Alexander	Dickey	Mathematics & Statistics BS
Laura	Behm	Mathematics & Statistics BS

The Math and Stat Department hosted the MAA Missouri Section Meeting in Spring 2022

The annual Missouri MAA Section Meeting was held on April 8-9 at UMKC. While the meeting was hybrid, most participants attended in person. We had 73 participants in total. **Sarah Greenwald**, the Polya speaker, gave an engaging talk, titled *Good News Everyone! Mathematical Morsels from the Simpsons and Futurama*. **Tim Chartier**, the section visitor, gave another excellent talk, titled *Mathematical Celebrity Look-Alikes*.

We had 41 contributed talks, with 21 graduate students and 2 undergraduate students among the speakers.



Dr. Tim Chartier



Dr. Sarah Greenwald



MAA Missouri Section Meeting (April 8-9, 2022)



A few pictures from the MAA Missouri Section meeting hosted by the UMKC Math and Stat Department. The meeting was well attended and the MAA sent UMKC a thank you letter.

The [Missouri Collegiate Mathematics Competition](#) (middle picture) was hosted by the Department of Mathematics at **Rockhurst University**, which is a block east of UMKC.



Responses from our students included the following:

Zack Bright (Undergraduate)

I had a great time at the meeting. I had a lot of fun on Friday. I was running the registration desk with **Irene [Chang]** from 12-3 which allowed me to meet pretty much everyone that attended the meeting. I got to talk to a lot of UMKC grad students and faculty that I had never met before. Around 2:30 **Simon [Davis]** and **Rye [Ledford]** arrived, and we had a lot of fun hanging out and talking as the busyness of the registration desk died down at about this time. Simon is in 464WI with me, but I had never talked to him (I have 3 classes with Rye, so I know her a lot better), and now I feel like I have made another friend. I was only scheduled to help until 3 but stayed around because I was having so much fun. I also saw that **Dr. Melissa Menning** [UMKC iPh.D graduate], my Calc II professor from JCCC, was giving a talk and wanted to be there when she arrived so I could say hi and catch up a little bit. I also attended her talk at 4:15. Seeing my old professor who greatly influenced me as a math major was the highlight of the night. The banquet was fantastic. Rye, Simon, and I all headed there together. We were just attending the banquet, not helpers. I thought the food was excellent, better than I expected, and there was plenty of it. After the banquet, Dr. Greenwald gave her talk which I was really looking forward to as a long-time watcher of both *The Simpsons* and *Futurama*. After her talk we had the student social event which I was helping with. The best part was meeting other students from UMKC who I had either never met or spoken to. **Rachel [Nordstrom]**, one of the other helpers, is in my Stat 441 class, but we have never really talked before. We ended up chatting about homework and our college journeys in general for about 20 minutes after the social event was over. So, **for me the best part of the meeting was becoming acquainted with more of my fellow students.** I attended both talks. Dr. Sega sent me the zoom link for Tim Chartier's talk so Irene and I were able to watch it on my phone at the registration desk. I was surprised at how much I was able to follow, given that I have only taken Linear Algebra I. Sarah Greenwald's talk was my favorite, as I already mentioned. It really showed how math can be something we use in our hobbies as much as our professional lives.

Adriana Martinez Cappello (Undergraduate)

The Mathematics Competition went smoothly! everyone enjoyed the pizza! I helped on the registration and coffee table on Saturday. Overall, everyone enjoyed the coffee (especially the hazelnut flavor!) we had a lot of leftovers! **I really enjoyed helping out both days! It was great experience.**

Jacob Salas (Graduate Student)

Project NExT went very well for the most part. I enjoyed meeting the speakers and the 2 guests who attended in-person as well. The banquet went very well and the food was delicious. The talk was great, and my table was very engaged for the problems given to us. Additionally, I offered to help **Adriana [Martinez Cappello]** with running the registration/coffee area after my presentation, but she said she had it under con-

trol. It looked that way too; her table was very organized. I also attended the Plenary Talk and **enjoyed the run-through of how to apply math to an interesting problem like facial recognition.** I think Makayla [Devening] did a great job with the social. Since many of the students left after the Polya Talk to go home, there were more textbooks up for grabs than students at the social.

Makayla Devening (Graduate Student)

The social event went well. There were only about 10 students, so it was very laid back. **I attended Sarah Greenwald's talk and it was awesome! I loved how it was interactive, we had a ton of great math conversations at our table relating to the topics she presented!**

Rye Ledford (Undergraduate)

I helped with the coffee station on Friday. The coffee was a little late, but I doubt any guests noticed as the vast majority were listening to the lectures. Once it was set up it was a popular option, and everyone seemed glad to have some hot coffee! I attended the banquet, and the food was great with lots of options. Most students and faculty left after the banquet leaving just a few guest students for the student event. The student event was still fun and it was nice to meet other Math majors from UMKC. I attended Dr. Greenwald's talk which was interesting and **I'll be paying more attention to the math in cartoons, I never would have suspected they would contain high level mathematics in their jokes!**

Azzah Alshekhi (Graduate Student)

In my point of view, the sessions went very well, and the time management for each talk was very good. I really enjoyed helping moderate the two sessions. I learned a lot for example, preparing the room for the talk, setting up Zoom meetings, preparing the projector, etc. Also, I learned how to be prepared to help during the sessions. I enjoyed the talks very much, there were so many very helpful presentations that added to my knowledge not only in Math but also methods of teaching Math.

The Story of My JPMorgan Chase Data Science Internship by Zack Bright, Mathematics and Statistics Major

The Interview – Fall 2021

I'd been applying to various internship positions through the Handshake website, looking mostly for 'Data Analyst' / 'Data Scientist' positions. JPMorgan Chase (JPMC from here on) had a listing for "**2022 AI & Data Science Summer Analyst Program,**" so I applied at the end of September. Early in the second week of October I received an email that JPMC wanted me to record some video responses and answer some timed coding questions. I have found this to be a pretty standard first stage for the interview process amongst a handful of companies with similar

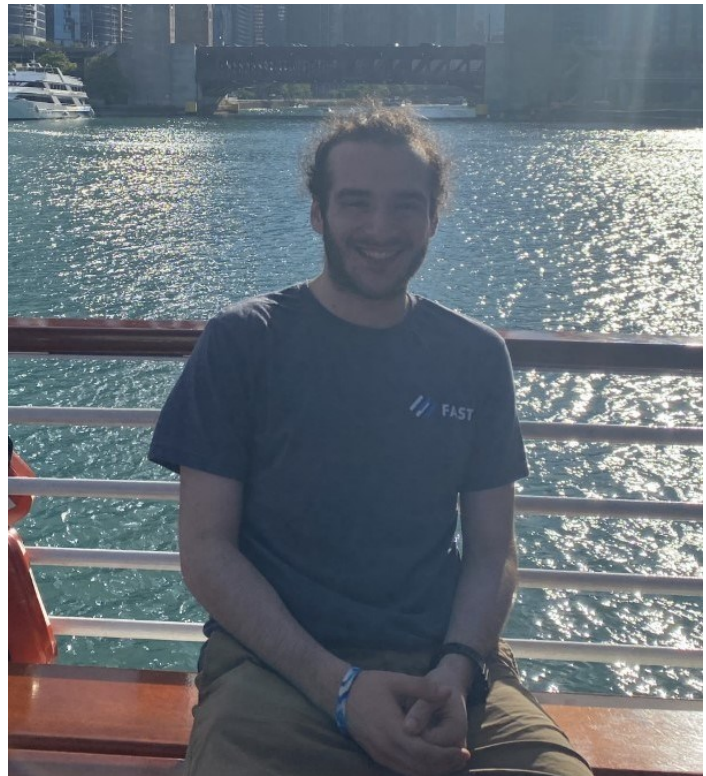
positions.

After completing these responses for them I did not hear anything for a couple of weeks. Then, towards the end of October I got an email that I was invited to take part in the final-stage interview. The process would consist of a series of three 40-minute interviews, all held one after the other via Zoom with a short break in between each to. In the email invitation it was explained that the three interviews would each cover different categories: 'behavioral', 'technical', and lastly a 'case study'. The instructions in the email said specifically to not try to prepare for the case study, as JPMC really just wanted to see how we think when given a problem to solve.

Something I was particularly trying to review before the interview were the basics of SQL (Structured Query Language). From the research I had done and experience in other interviews I felt like this would be an important thing to cover, since the more technical knowledge you have regarding business solutions, the better. That being said, I've found knowing nothing about certain languages or systems doesn't automatically disqualify you as long as you can display a sincere desire to learn. To my surprise, SQL wasn't even mentioned. While I don't think this is necessarily the norm, if I could change anything I would spend more time reviewing statistical concepts I was already familiar with instead of trying to add to my weaker knowledge of database management systems. In short, I would have focused more on bolstering my strengths.

For the behavioral interview I was faced with a lot of the types of questions you might expect to be faced with in any interview: "What about working at JPMC interests you?", "What are your strengths?", "What would you add to JPMC?", "Where do you see yourself in five years?", and so on. The best way, I found, to prepare for these kinds of questions is to try and think about some of your best accomplishments and goals before going into the interview. That way you have a couple of instances fresh in your mind. Something really important is that if you say you are a team player or a good leader, be ready to offer an example of a time you worked well on a team or succeeded in a leadership role. Don't just say what you think sounds good. This leads into the best advice I was given, which is to be yourself. During this interview I was able to mention how I am deeply interested in cryptocurrency and how much potential I thought it could bring JPMC. This led the interviewer to ask more cryptocurrency based questions, which I was able to answer very comprehensively because of my personal interest. Trying to direct the conversation towards topics you are interested in can be very useful, but it's also important to make sure you are answering what is being asked of you and not going too off topic.

In all three of these sub-interviews, the interviewers each left five minutes at the end for me to ask them any questions I had. Asking the interviewer good questions can be a great opportunity to make yourself seem genuinely interested in what they do and that you are thinking about what is being said to you.



It's also a great way to make sure that you leave the interview on a positive note. I do my best to listen throughout the interview for something that particularly interests me, that I can then ask about later. If I don't notice anything, my general go-to question was, "What have you personally had to work on the most since you started at JPMC?". I was told this was a great question by all three interviewers. I think it is good because not only are you asking about them, which shows respect for their experiences, and the company, you are additionally displaying that you are already looking for ways to prepare yourself further if you are selected.

In the second interview, the technical interview, I felt more confident and it was thanks to my classes. This interviewer began by explaining that I was not expected to know the answer to every question, and we could talk out ideas together if I was unsure. The first question was, "If I gave you a coin how would you determine if it is a fair coin?". This led into a pretty relaxed back and forth discussion of expected value, hypothesis tests, binomial distributions, and the z and t statistic. I was also asked if I knew the difference between correlation and covariance, which I had thankfully just covered in class. Many of these topics were very recently taught in my **STAT 436** class, so I was able to recall some formulae from memory. The interviewer also asked questions to test my programming experience. We use Python in my **COMP-SCI 101** class, so that is the language I know the most about and have the most experience with. Python is a very popular language and this interviewer at JPMC said a lot of his job involves programming in Python. He asked about what programs I was recently working on. Luckily I had just worked on a program for a lab that had a function within it relevant to data science. I was able to talk him through how I

wrote that and he was impressed with my correctness. My advice here would be to make sure you are practicing some kind of coding language so you can recall pieces of code like this. For any data science position it seems pretty necessary. If programming isn't your strong suit at the moment, try and express a strong desire for a chance to learn and gain more experience. These companies know we are students and expect us to be learners in some respect. I've found that the attitude of the company is they are willing to teach someone who shows they actually will put in the effort to learn.

Generally speaking, a lot of the technical questions were phrased as follows: "If I gave you x problem, what is the model you would use/build to get y solution?" The big idea here is thinking in terms of models. The interviewer was not just interested in my statistical knowledge, he wanted to know how I would utilize it to build something that JPMC could profit from. This was a big takeaway for me. When approaching their questions I really wanted to come at it from the angle of "What is the model I would build using what I know to solve the problem?" This isn't really something I have considered much yet across my classes, but in **MATH 300** we often talk about how the power of Linear Algebra is its ability to solve a vast variety of problems by considering real life objects by describing their qualities in terms of our mathematical systems. So this way of thinking wasn't entirely foreign to me. Just as in the last interview, there was five minutes for me to ask questions at the end. I noticed by now that things at JPMC were very punctual.

The last interview was the case study, for which I had no particular preparation, so it was safe to say I was more nervous for this one. However, having come fresh out of two pretty good (I thought) interviews, I felt more confident than I expected. This interviewer had the most down to business attitude of the three. He introduced himself to me as the head of a team that deals with a lot of their commercial banking services data such as mortgages, personal loans, savings accounts, and the like. For the entirety of the 40 minutes I was posed with just one question. It was as follows: "Given the account data of everyone in the JPMC system, produce an estimate for the number of Americans within the JPMC financial system who have a rent payment, and describe the model you would use to find such a number." I still am unsure if the answer I gave was even close to the right number or even what the interviewer was looking for. I'm not sure if he was trying to remain circumspect, or if he just had an unexpressive demeanor, but I could not read this interviewer as well as the others. When I began to struggle to move forward in the problem, the interviewer suggested I speak through my thought process. It was here that I really was relying on the skills I have learned in my **MATH 301** class. Being able to both systematically reason from what you know to what you don't know, as well as explain logically to another person your process was key here. A large part of my solution was explaining the constraints I would add to the raw data to decrease the elements in the data set to get closer and closer to a set containing only rent payment transactions. Communication here was vital. If I had not been able to concisely de-

scribe my ideas then the difficulty of this interview would have increased by many magnitudes.

The biggest surprise of this whole experience was how directly each of the classes I am currently enrolled in helped me in the interview. I had previously believed that as a Junior in college, the level I was at meant that the math we are learning is still too theoretical to be usefully applied in a business application. If I learned anything, it's that everything I have done so far this semester is even more important than I once thought and I have learned more from my lessons than just the mathematics. Some of my best responses in the interview came directly from in-class knowledge.

During the Internship – July 2022

It's been four weeks since my internship started and I feel like more than enough has happened now that I can share what I have been up to and how it has all been going. I am interning at JPMorgan Chase (JPMC) in their A.I. and Data Science department. I am working at the Chicago, IL office in downtown Chicago called Chase Tower.

I am working in the **Consumer and Community Banking** area of the bank which handles all their commercial banking and lending side of business, think anything that happens in a bank branch. In total they serve over 60 million households in the US. This means that I, and the other interns are working on big data projects. There are seven data science interns here in Chicago including me, and about 130 interns across all the departments in Chicago. In total, there are over 2500 interns across the entire company worldwide.

For most of the internship I will be working on two unique projects with two separate teams. My "main" project is about seeing if there is a way to optimize which types of bankers call customers for specific sales purposes. Basically, there are different types of bankers and different reasons they make calls to customers called leads. My teams job is to see if we can match certain types of bankers to specific types of leads to maximize the effect the leads calls have on the business. I am working on a small team with two other interns; both are located in different locations in the US, so we meet using Zoom. My managers for this team are also not located in Chicago. For this project a lot of the work so far has been organizing and cleaning the data to get it into the form we want so we can do the statistical calculations and analysis that we want to do. We just got everything into the form we want and over the next week and a half should be able to get all the analysis done that we plan to do.

I have learned so much in just the last four weeks on the skills a data scientist needs. We have had multiple Zoom conferences to learn about certain programs or skills. We also have self-directed learnings with third party courses on partnered websites. I am almost impressed with how much I have been able to learn in just a month. Before this, I really didn't know much about the daily life of a data scientist and

now I feel like I am well on my way to becoming a capable analyst.

My second project is a case challenge. Whereas the “main” project is something unique for each team, the case challenge is the same for all the teams. We are tasked with looking for drivers of housing prices with the goal of identifying predictors of changing housing affordability and offering our best policy suggestion for how to tackle to the issue of rising house costs. For this project I am working on a different team than the “main” project. I am working on a team with four other people, again all of them located in different offices across the US. For this project, I have kind of taken a leadership role in my team. Our challenge coach, who is kind of like a manager/mentor, has not been very communicative and has yet to attend one of our meetings despite my invitations. So, I have taken it upon myself to lead the discussion and strategy. I didn’t mean to do this, but in our first meeting no one was talking and I wasn’t afraid to be the first to talk so I just started the discussion and since then the team has sort of relied on me to lead the meetings. In a way, this has been a great learning experience that I have kind of made for myself. Working on a team with people I’ve never met before has been teaching me a lot in and of itself, but to try and be a leader is another thing. I am really glad I am trying this, because it is additional learning that I think will go a long way. So far, we haven’t gotten much done beyond planning our strategy for this project as it started later than the “main” project. But we are going to look at it from the angle of the stock market as a proxy for the economy as a whole and see what correlations we can find in the price action of the market compared to various housing affordability indexes.

In addition to all these technical skills using things like **Python, SQL, Tableau, Excel, Teradata, etc.** I am also learning a lot about working on a team with a deadline, being a leader, and navigating corporate life effectively. Despite JPMC being one of the largest companies in the world, adapting to corporate life hasn’t been too difficult for me. There is actually quite a laid back vibe at work. I think it’s because everyone is so intelligent, motivated, and good at what they do that so long as everyone continues to work hard the management doesn’t really need to be on our backs about getting stuff done. Honestly just being around all these young, brilliant and motivated individuals is a great experience. It really lifts me up and makes me want to push myself harder and harder to keep achieving more.

In addition to all the work and learning, there has been a plethora of fun and activities. JPMC has been taking us out on all kinds of excursions across Chicago. They are very much ‘wining and dining’ us. We’ve gone to axe throwing, the Art institute, Wrigley Field for a game, multiple dinners, the Architecture river cruise, volunteering events, and there is much more planned for the rest of the summer. And that’s just the stuff we have done through the company. Myself and the six other interns have become very good friends and have gone out pretty much every weekend. We’ve gone to bars, the beach, restau-

rants, comedy shows, concerts, fireworks shows, the lake, the river, and have all kinds of stuff planned out.

The number one question my family has been asking me is do I plan to take the job should I receive an offer at the end of the summer. I have been having the best summer of my life. I know that I am kind of in vacation mode, where everything is always better than at home. Even so, I can’t deny how fun and amazing the experiences here have been. Assuming I do well, JPMC would extend a two year contract offer to me, in which I would be doing a lot of what I have been doing here just working across various lines of business to get more experience of what the company does. I have been trying to think a lot about my future and my goals and I think being here, learning for two years, would be a great opportunity. I think going to grad school would be a great experience as well, but for the most part it wouldn’t be possible for me to do without great financial support. JPMC offers that support, so through working for them I could hopefully complete a Masters degree eventually. I’m trying hard to find drawbacks of taking the job, but haven’t really found anything substantial that can stand against all the seemingly giant benefits. It seems like this is too good of an opportunity to not take.

Anyway, that’s pretty much everything so far. To summarize, I would say attaining this internship and being here has been one of, if not the, best experience of my life.

After the Internship – October 2022

At the end of the internship, all the project teams had to give presentations to all the associates, managers, and members of the other teams. For this my team and I prepared a slideshow presentation and a script to make sure we were able to give an excellently prepared final presentation. An important aspect of this was simplifying the language of your results so that wider audiences that don’t have detailed background knowledge of your line of business can still gain something from listening. I want to mention this to emphasize that **even in a technical career like a data analyst there is still a necessity to be able to communicate effectively and work well with others.**

Overall, I learned more from this internship than I thought I ever would and a lot of it was not necessarily related to the job itself. Of course, I got a great taste of what it will be like to work as a data analyst full-time, but I also grew as a person. Something JPM emphasized was that they value emotional intelligence. That is to say, they are looking for people who understand what it means to work with other people in a highly collaborative environment. I would assume they are not unique in this respect.

Another thing I really want to emphasize is how directly my classes played a part in my preparation for this role. The concepts learned in **MATH 301, STAT 436, STAT 441** gave me great foundational knowledge in logical problem solving and statistical analysis. I also heavily relied on the **Python programming** skills I picked up in **COMP-SCI 101**. Seeing that the knowledge

gained from the classes I've taken here have real world applications adds tremendous value to the Mathematics department in my opinion.

Networking is a word that used to intimidate me, but now I understand it so much better. **Taking part in an internship like this was an amazing opportunity to meet new people and build my network.** Although there were only seven interns in Chicago in my specific program, there were over 130 interns in Chicago, and I got to meet many of them throughout the summer and connected with dozens on LinkedIn. I also became great friends with the other six interns in my program. One of which, for example, attends Princeton University, another UC Berkeley. Being able to extend my network to places I otherwise would probably not be able to is something that cannot be understated. Seeing that **my education at UMKC puts me toe-to-toe with students from some of the best schools in the country** is a testament to the quality of our professors and degree programs.

We were not informed of the status of our offers until the last day of the internship. Most of the interns got offers, but definitely not everyone. Thankfully, I was offered a full-time return offer, of course, conditional on my graduation. I happily accepted. **I will be moving to Chicago after I graduate in May 2023.** I know that I am extremely lucky that I was chosen for and able to take part in the internship. That said, it would not have happened if I had not applied in the first place. Something I did as soon as I got back was tell all my friends to apply for positions for next summer. I would recommend every student do an internship in as far away of a place as they can reasonably get to. Getting valuable experience in industry and trying out a new city with all new people has been instrumental in my development as a human being in all aspects of my life.

Day-in-the-Life of a Mathematics Graduate after College

by Richard Schneider, B.S. Computer Science and B.S. Mathematics and Statistics awarded Fall 2021, currently software engineer on a Property & Casualty Model Monitoring team.

University students have limited knowledge about what corporate jobs look like in their field. This article aims to provide one view of how your education evolves into experience. It includes an account of how I structure my day, with examples of the work I do.

Morning

When I first get to work in the morning, I check my email. **The technical side** gets notifications of technical failures that need to be addressed or questions about technical capabilities that our team is familiar with. **The business/statistics side** is typical-

ly communications about understanding where to access data from or follow-ups to previous concerns.

I respond to the questions I can and possibly add items to that day's to-do list for more difficult requests or technical issues. If an issue is large enough, it becomes a "story," which is our [Agile](#) name for tasks that the team collectively prioritizes and work on. The core concept of Agile is that large projects get broken up into smaller, independent tasks that can be reprioritized and rewritten as needed, without reevaluating the entire project. Thus, for a new concern or requirement, a story is written, and the team can decide how urgent that is versus previously planned work.

After handling my inbox, I continue work on the stories that have been assigned to me. Scheduling part of my morning for this, when I am the most effective, is the best way for me to make progress on these efforts such as: time spent researching, writing more emails to ask other people questions, or working on implementation details of programs.

Mid-Morning - Meetings

After working alone for some time in the morning, the morning meetings are focused on team collaboration: Discuss progress on our individual work and goals for the day, request feedback on any questions we may have, such as team-level decisions like the naming of a project or getting recommended contacts for other teams, planning for upcoming work, reflections on previous weeks, or final reviews of current work that we would like to mark as completed.

Afternoon

This time is either spent in a continuation of my individual work from the morning, or in a string of meetings with other members of my team or a team that we work closely with, each limited in scope, and inviting only those that provide the most information, meant to be collaborative exchanges. A 15–30-minute meeting could easily provide more in-depth knowledge faster than sending four people the same email and waiting a day or two for a response. Examples here: if someone is attempting to do work with a new side of our technology stack that others are more familiar with, are trying to access or understand data sources, or would like feedback on their thought process and approach to a problem.

Other longer meetings are for doing task work that team members decided to do together. An example is for knowledge sharing while doing work. Instead of dumping loads of information on a new hire and expecting them to immediately understand the processes, it's easier to work together on a task in a way that limits the specific knowledge that you hope to share and



lets them spend more time with the pieces. This also helps teams be cross-functional where someone specialized in a specific technology can work with others and spread that knowledge.

Applications of Mathematics—

Creating a Metric

A conservative estimate for my overall day is roughly 4 hours spent on project work. What kinds of tasks might these be? For model monitoring, we research and implement metrics on models and data. For the most part these are lumped into two categories: stability and performance. Both of those have classical ideas about metrics. From your statistics courses, you may remember hypothesis testing to compare samples and populations, and error metrics to compare the types of errors with regressions. These are basic examples of starting points in our research and monitoring.

One recent example I worked on is the stability monitoring of a population that we expect to shift over time. I will cover my thought process from start to finish, and hopefully show how my mathematics background helped improve my understanding and decisions. Throughout each of these steps there would be chats with coworkers to collaborate on the research, such as asking new questions or helping weigh options.

Data Access

What if you wanted to look at the stability of the cost of ground beef across the country. You would first want to find a source for this data, such as grocery store websites, and understand other important information: how often is this updated? are the units consistent? what is the geographic location of the store? what other information might you want? etc. This data would become your samples you collect over time.

Understanding the Data

We can do some tests on these samples to test different types of distributions, say [Kolmogorov–Smirnov](#) testing against different CDFs (Cumulative Distribution Functions). Pretend that the distribution of beef prices has a normal distribution, then use the mean, variance, and sample size as a baseline for your beef prices and test the mean of future samples against this baseline with a simple T-Test.

However, beef prices are likely seasonal and since they are monetary, they are subject to inflation. Seasonality could be addressed by changing the timeframes, such as comparing the current month against the same month last year, but what about inflation? This means we can't compare against a baseline/prior period too far back; we would expect the mean of the current sample to continue to shift upwards. Variance will also increase over time since we are not looking at a simple additive translation of the data, rather a scalar one; but mean and variance are still useful distribution metrics. Once we know what we want to measure and why, we can look at the how.

Finding a Metric to Monitor

Suppose we have narrowed our focus of the change distribu-

tion in beef prices to change in variance where mean hypothesis testing is common. We must find a way to compare two variances. This is something I have never tried to do before, nor did I have background knowledge on the subject since most hypothesis tests I was aware of did not allow freedom for differences in means between the distributions. A simple Google search raised three possible candidates: F-test, Levene, and Bartlett tests. The F-Test compared the ratio of two variances assumed to come from two normal populations and the other two tests did not assume normality but instead required calculations on the sample data. (I omit the remainder of the technical details.)

Thresholding

Finding a threshold is slightly different from other experiments. A common concern is alert fatigue, where we constantly see alerts that we end up ignoring. So instead of just choosing a bound because we want it, we need to test the metric on historic data and find a threshold that seems reasonable. The goal here is to look through different variations of the test and find bounds that filter out un-concerning results while keeping those that might need to be investigated.

What are some possible variations in our beef example? The immediate and obvious ones would be to compare the previous day's beef prices to today's prices or the previous month's vs. the same month last year. But what about the group of grocers who changed their prices today vs the full group yesterday? Is this useful, what does it tell us, and do the difference and variation in sample sizes change anything? These are all questions that would need to be addressed to get a better understanding of the metric's results and robustness.

Implementation and Interpretation

This metric, from data consumption, calculation, and threshold testing, would then be programmed and implemented. Continuing our beef prices example, we would expect to see large scalar transformations overall or any shifts within our distribution. Large-scale, simple examples could be: hurricane preparations that slow shipments of food or cause consumers to attempt to stock-up at the last minute; a hurricane impact causing longer-term power instability that affects non-shelf-stable food options; a hurricane through parts of Texas causing issues with cattle ranching or feed production with effects lasting for months or years after.

In the example of beef, the consumer impact of smaller events is minor in our world of highly managed, international supply-chains, but these could include previous events at smaller scale, such as a grocery store losing power for an extended period or a local area's environmental issues (flooding, fires, disease, etc.).

For all these events, this beef metric is a trailing indicator, so it probably wouldn't be useful to those in the supply chain from feed production to ranching to meat packing to grocers, but it may help a further downstream consumer. Although this was an entirely fictional example, it follows my thought process in how I use mathematics day-to-day.

Takeaways

I find that most of the effort in a job is not the actual job, but rather the planning, communication, and research that is required around the tasks done. As you can see in the example of metric creation, mathematics knowledge is about fifteen percent of the job and the rest is soft skills and problem-solving.

The biggest contributions that mathematics has made in my day-to-day life is mainly in my thought process when problem solving or interpreting information, being able to think about abstract processes, and being able to read technical information quickly (it's just a series of definitions or steps). When it comes to interpreting something, there are many, many ways of doing so. I have a bottom-up approach to problem solving that I like. I find that if you often start with simply listing questions, which are hopefully more specific and answerable, this helps you become more informed rather than accepting an initial response simply because it is easy.

There are differences between class and work when problem-solving. When asked a question at work the person asking doesn't know the answer and finding the answer is much more open ended. There is also no syllabus or recommended background knowledge, finding resources and prioritizing work is entirely up to the team.

More Recent Student News

Undergraduate (now recent graduate) **Dominic Guillen** wrote an expository paper for Math 464 WI, titled "**A Simpler Annuity**", based on de Moivre's work, which was published in the UMKC Honors Program research journal *Lucerna* in March 2022, p. 102, see [here](#).



Undergraduate **Rye Ledford** wrote an expository paper for Math 464 WI, titled "**The Assumptive Attitudes of Western Scholars Regarding the Contributions of Mathematics from India: Assessing *yukti-s* from the *Yuktibhāṣā* of Jyeṣṭhadeva**", which **won the national HOM SIGMAA (History of Mathematics Special Interest Group of the Mathematical Association of America) contest in May 2022**. See [here](#). She was awarded a year membership to the MAA and a book of her choice from their catalog:

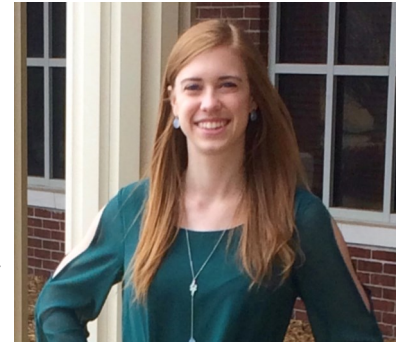


Foundations and Appli-

cations of Statistics: An Introduction Using R, 2nd edition published by Randall Pruim.

(All Math 464 WI papers mentioned above were supervised by **Dr. Richard Delaware.**)

Graduate **Callie Lane**, on September 14, 2022, wrote: "During my second year at KU Med, I worked in the BRAIN lab at the KU Lawrence campus working with the team to analyze gait kinematics in neurodevelopmental disabilities, specifically FXTAS (Fragile X associated tremor/ataxia syndrome), and published a research paper with the results. In May 2021, I graduated from KU med with my **doctorate in physical therapy**, and I have been working with **Performance Rehab as an outpatient physical therapist** and am **one of the physical therapists for the Kansas City Ballet**. We work backstage at every show and I love it! I also got married in May of this year (2022) to my husband who is also graduated from UMKC in 2018."



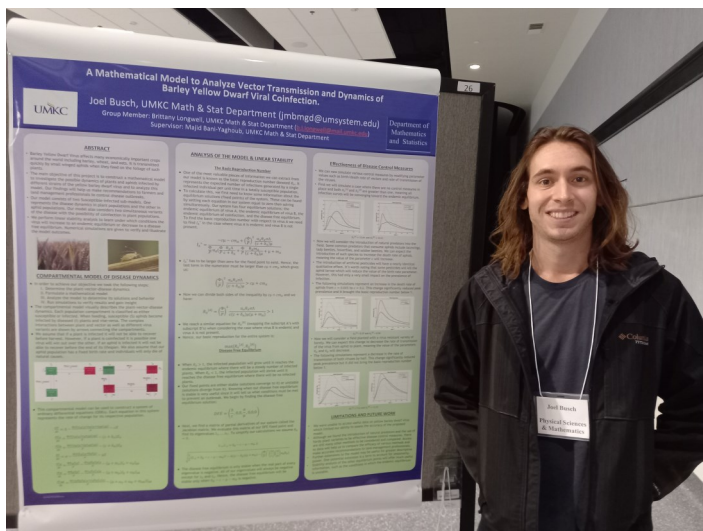
Undergraduate **Zack Bright** wrote a post for the MAA's blog **Math Values** on June 29, 2022, titled "**Students Speak: The best thing my professor did for me to make me feel welcome in class**", see [here](#). (Dr. Richard Delaware had suggested his name to the MAA.) The professor he wrote about was our own iPhD graduate **Melissa Menning** (advisor **Dr. Liana Segal**), who responded to Dr. Delaware on July 6, 2022: "Thank you so much for sharing Zack's article with Liana. She forwarded the link to me. I feel so honored to have been the focus of his writing! He writes well. It is amazing the things we do in the classroom that we don't realize have an impact."

Graduate **Tiancheng Xie** sent a note to **Dr. Liana Segal** on April 10, 2022: "I hope you had a great start to the year 2022 and had a refreshing spring break. This is Tiancheng, who took **your Calculus II class in Spring 2018**. I also participated in a calculus competition [our annual Integration Bee] with my friend Nick that semester, and I got first prize, Nick got second, if you recall. I am writing to you to catch up and update you on my time after graduation from UMKC. We had an impressive talk about pursuing math grad school at UMKC in 2018, but I finally went for a **Computer Science Master's program**. After graduation almost 2 years, I am in **Google right now as a software engineer**. There were lots of things happening, I know I wouldn't achieve those things without your help in that class. I am very grateful to you because you gave me the chance to demonstrate my math ability in that competition, which helped me rebuild my confidence."

Graduate **Ngan Nguyen** wrote on March 11, 2022: "I am still

living and working in Los Angeles. I think this July [2022] will be my 3rd year- it's so crazy how time flies. I do try to visit my family often. I miss being close to them. I think I'll eventually end up moving once I settle down since it's almost impossible to buy a house out here. As for my professional life, it's been a learning experience navigating the working world. I don't regret getting my Master's because I have learned so much, but I wish I knew that experience matters a bit more. As of now, I am a **Financial Analyst at an Aerospace company**. I can't complain as I have learned a lot from this experience and have a great work-life balance, but I am ready to use my **Master's degree**. The tricky part is getting past the resume and recruiter screening. I'm finding that my Master's program gave me the statistical modelling and R programming tools but the job market requires previous experience in SQL and Tableau, which I don't have. I am taking Udemy courses but many job descriptions want people who have already applied those in a job setting."

Math major **Joel Busch** presented his undergraduate research titled **"A Mathematical Model to Analyze Vector Transmission and Dynamics of Barley Yellow Dwarf Viral Coinfection"** at the 2022 UMKC Symposium of Undergraduate Research and Creative Scholarship. His work was mentored by **Dr. Bani**.



UMKC Students Presented their Research at the MAA Meeting

Several UMKC graduate and undergraduate students presented their research at the 2022 MAA Missouri Section Meeting. The following list contains the names, academic level and majors of presenting students:

Alanazi, Mohammed Naif H	Mathematics MS
Alenezy, Fatima	Statistics MS
Haque, Tohfa	Elect & Comp Eng iPhD
Menta, Kathryn Kohler	Mathematics MS/Statistics MS
O'Connor, Sean	Physics MS

Parra, Thomas	Mathematics MS
Sailor, Cole	Mathematics MS
Salas, Jacob R	Statistics MS
Schaeffer, Alex	Mathematics MS
Taylor, Demetrius	Mathematics iPhD
Van Wig, Trisha	Curriculum & Instruction MA
Vaughn, Braeden	Mathematics MS
Whitaker, Josh	Curriculum & Instruction MA
White, Maggie Ann	Mathematics MS
Busch, Joel Matthew	Mathematics & Statistics BS
Dickey, Alex Michael	Mathematics & Statistics BS
Jenkins, Allyson G	Mathematics & Statistics BS
Soysal, Dilek	Mathematics iPhD
Alshekhi, Azzah	Mathematics iPhD

Congratulations To Our New PhD Graduates!

Dilek Soysal, Azzah Alshekhi, Hadeel AlQadi and Matthew McCoy were awarded the Doctor of Philosophy in Mathematics. Below are the titles of their dissertations and the names of their supervisors. Congratulations to the new PhDs and their supervisors.

Soysal, Dilek (2022) A Mathematical Modeling Approach to Analyze the Dynamics of Math Anxiety. Supervisor: **Dr. Bani**

Alshekhi, Azzah Ahmed (2022) A Cubic Spline Projection Method for Computing Stationary Density Functions of Frobenius-Perron Operator. Supervisor: **Dr. Rhee**

AlQadi, Hadeel Hassan (2022) A Modeling Framework for Spatial Transmission of Covid-19 in Local Communities. Supervisor: **Dr. Bani**

McCoy, Matthew (2021) Moving Mesh Finite Element Method for Time Dependent Convection-Diffusion Problems. Supervisor: **Dr. Li**

Apply for Math & Stat internships

- There are several internship opportunities available in the Kansas City metropolitan area such as offered by Sprint, Cerner, Lockton, & H&R Block. There are also internships listed by the [American Mathematical Society](#).
- Deadlines for summer programs usually occur during the previous Fall or Winter. There are also many applications due January- March of each year.

Rachel Crowell, who graduated from UMKC in Dec. 2014 with a B.S. in Mathematics, and was awarded the 2015 AMS-AAAS Mass Media Fellowship, has been getting writing bylines in **ScienceNews**, for example, in the December 4, 2021 issue, p. 11, “**Elusive equation describes all bird eggs**, Shape formula may help with food and conservation research”, and pp. 12-13, “**How pearls get their round shape**, Understanding the symmetry could inspire better materials”, in the December 16, 2021 online **ScienceNews for Students**, “**From icebergs to smoke**, forecasting where dangers will drift,” and in the February 21, 2022 issue, “**Why some icicles become scallops not spikes.**” See a dozen or more of her ScienceNews for Students articles [here](#).



Graduate **Laila Awadalla** just earned her PhD in July 2022 at the University of Nebraska. While at UMKC, she had one of her Math 464 WI papers, “**Cantor’s Proof of the Nondenumerability of Perfect Sets**”, published in 2017 in the Rose-Hulman Undergraduate Mathematics Journal. See [here](#). She already has 577 downloads!



Olivia Rippee, May 2022 triple-major graduate (Mathematics, Biology, and Chemistry) is now a **Research Assistant** in the Bose and Pritchard Labs, and studying for an **M.S. in Biostatistics** she hopes to earn by Spring 2025, at the Department of Microbiology, Molecular Genetics & Immunology of the University of Kansas Medical Center. On October 5, 2022, she



wrote: “My new biologist job is very different [from her undergraduate research experience at the Stowers Institute last summer]. These mouse experiments take 10 weeks to set up and 1-5 weeks to execute (yikes!). Zebrafish were so easy...all you have to do is set the animal up the night before. Mammals are so overrated! It’s not too bad though, since I get to spend the interim time quantifying everything and (re) learning SAS for my MS in Biostatistics.”

Undergraduate **Allyson Jenkins** wrote an expository paper for Math 464 WI, titled “**The Development of the Normal Distribution**”, based on the work of de Moivre, Adrain, and Gauss, which will be published in the Honors Program research journal **Lucerna** in March 2023. [Her picture appears on page 2 of this newsletter.]

Distinguished mathematics alumnus, **Dr. Juris Hartmanis**, died on July 29, 2022. From our department, he received a **Master’s degree in mathematics in 1951** (Faculty Advisor: Maria Castellani), and was later the first chair of computer science department at Cornell University.



He won the **1993 Turing Award**, the computer science “Nobel Prize”. UMKC awarded him an Honorary Doctor of Humane Letters in May 1999, and he was elected to the National Academy of Sciences in 2013. The following is an excerpt from his 1993 Turing Award Lecture, *On Computational Complexity and the Nature of Computer Science*, published in Communications of the ACM, October 1994, vol. 37, No. 10, pp. 37-43:

“I was born in Latvia [July 5, 1928], which lost its independence during World War II and from which we had to flee because of heavy fighting at the end of World War II. After the war as a D.P. (displaced person) in Germany, I finished a superb Latvian high school in a D.P. camp staffed by elite refugee academics who conveyed their enthusiasm for knowledge, scholarship and particularly for science. I studied physics at the Philips University in Marburg and waited for a chance to emigrate to the United States. This chance came after about two-and-a-half years of studies. In the U.S. our sponsors were in Kansas City, and, after arriving there, I proceeded to the **University of Kansas City** (now part of the University of Missouri system). My two-plus years of study were judged to be the equivalent of a bachelor’s degree, and I was accepted for graduate work and very generously awarded a fellowship. Since there was no graduate program in physics, I was advised (or told) to study mathematics, which had a graduate program. A year later **I emerged with a master’s degree in mathematics and with a far better appreciation of the power and beauty of mathematics.**”

Recent Faculty News

Dr. Liana Segal spent part of summer 2022 doing research with a group of collaborators (all women) at the [Oberwolfach Research Institute for Mathematics](#) in **Germany**, which provided all accommodations for a productive stay, including a wonderful hilly view in the middle of the Black Forest. She also gave an invited talk at the [AMS-SMF-EMS Joint International Meeting](#) at the University of Grenoble-Alpes in **France**. [In the picture, she's second from the right.]



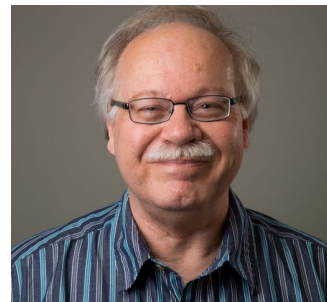
Dr. Shuhao Cao joins us as an **Assistant Professor** this fall. He's a computational mathematician and worked on a method called "finite element" back in his **PhD days at Purdue University**. Now he's more dedicated to bringing together the theory of partial differential equations and deep learning. He (scaomath@GitHub) hangs around on **GitHub** a lot contributing to open-source software. Shuhao also loves sharing his code on **Kaggle**, a machine learning competition platform. In his spare time, Shuhao likes jogging, and playing a board game called Go. He previously taught at Washington University in St. Louis and the University of California, Irvine, and in addition to mathematics courses such as Partial Differential Equations, he's taught Python programming.



Math & Stat Fast Track programs

The [mathematics](#) and [statistics](#) fast track programs offer students an opportunity to meet the full requirements of the BS and MS in Mathematics and Statistics in a shorter time period than the separate degree programs.

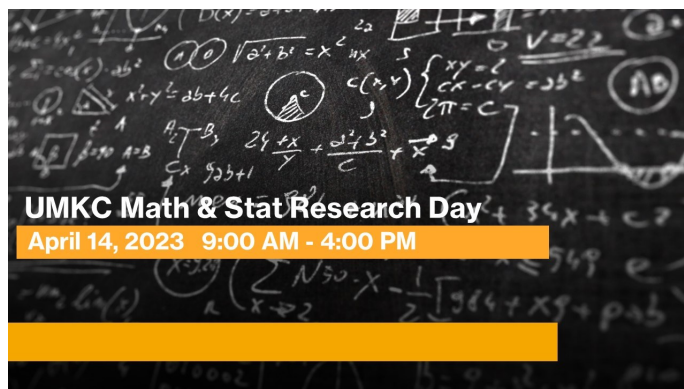
Dr. Richard Delaware has moved in a literary direction with his writing since 2019, with now five **creative nonfiction/ memoir publications** in the *Journal of Humanistic Mathematics* [see [here](#)], and one in July 2022 (about 150 words) in [Unbroken34](#) titled "Teaching Sounds: Mathematics Exam Proctor." As a side project, his **middle school/high school book** "[Short Geometry Labs, Visual and Tactile Understanding First](#)" appeared in May 2022, co-authored with well-known mathematics education professor Dr. Frank Gardella of Hunter College, New York.



Dr. Majid Bani was awarded a large CDC grant. He has assembled researchers from the UMKC Division of Computing, Analytics and Mathematics; the UMKC Department of Biomedical and Health Informatics; the UMKC School of Medicine; University Health; the Kansas City, Missouri, Health Department; and the University of California-Davis School of Veterinary Medicine to form the **Midwest Virtual Laboratory of Pathogen Transmission in Healthcare Settings (MVL-PATHS)**, an interdisciplinary research collaborative.



The Centers for Disease Control [awarded MVL-PATHS](#) a **three year \$879,162 grant** to develop a new generation of mathematical and computational models of infectious diseases. The team will use the **One Health modeling approach**, which incorporates interconnections between people, animals, plants and their shared environment.



For more information about the Math & Stat Research Day please visit <https://sites.google.com/view/mathrd/home>

Fun Math Problems:

Problem # 1 - Grasshopper

A grasshopper starts at the origin in the coordinate plane and makes a sequence of hops. Each hop has length 5, and after each hop the grasshopper is at a point whose coordinates are both integers; thus, there are 12 possible locations for the grasshopper after the first hop. What is the smallest number of hops needed for the grasshopper to reach the point (2021,2021)? Source: 2021 Putnam competition.

Problem # 2 - Don't Drink and Drive; Have fun with Calculus!

You're out celebrating with your friends because you just found out that you got an A on your calculus I final. You're concerned because you drove to the local tavern, and you know that drinking and deriving (Ha!) or drinking and driving don't mix. But you decide to let loose a bit and treat yourself to some 12-year-old scotch to celebrate. The bartender is a friend of yours and often pours you generous amounts, i.e., above the standard 1.5 oz drink. You would like to be careful so you thought that you could figure out the volume of the scotch as a function of the height of the scotch in the glass. Here is a picture of the glass with a penny for scale. The diameter of the penny is 1.9 cm.

Using the "shell" or "disc" method, derive a function relating the volume of the scotch in the glass as a function of the height of the scotch. Assume that the sides of the glass are straight and not concave.

1. Show the dimensions of the glass.
2. The derivation of the equation
3. Fill the glass with 5 different known volumes (don't need scotch, ha) and measure the height in the glass. You may have to use and measure your own glass if it doesn't match the one in the picture.
4. Given your equation, predict the volume of the scotch in the glass from your measured height. Graph the predictions and actual data on the same graph. How close are your predictions to the real volumes?

Source:

Professor Mark E. Chertoff, PhD
Department of Hearing and Speech
University of Kansas Medical Center

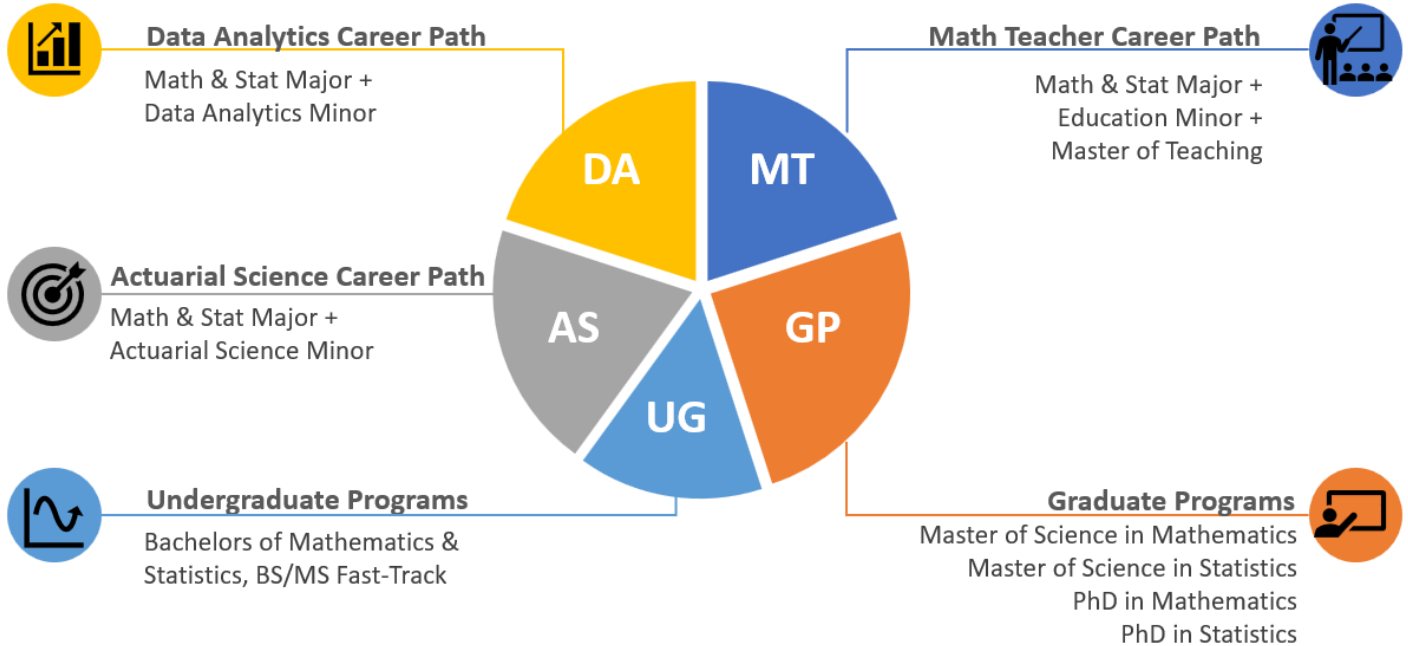


[Professor Chertoff](#) is a member of the Acoustical Society of America and the Association for Research in Otolaryngology. He has been actively engaged in significant research for many years at KU, and his focus is on development of audiologic diagnostic tests that identify the location of lesions within the cochlea and auditory nerve. He has used mathematics extensively in his work.



UMKC Math & Stat Department

Graduate Programs, Undergraduate Programs, and Career Paths



Why Major in Math at UMKC?

The Bureau of Labor Statistics (BLS) projects math occupations to grow 27% between 2019-2029, which is much faster than the national average for all occupations. There are several reasons to become a math major at UMKC including but not limited to the following: Students are prepared for stable and well-paying careers in mathematics and statistics, students can enter the fast-track programs to obtain their math or stat master's degree in a shorter time, and we offer undergraduate research and provide support for those who would like to obtain an internship or gain undergraduate research experiences.

Minor in Actuarial Science

Actuary job growth between 2018-2028 is expected to be about 20%, with a median salary of \$102,880 per year, according to the Bureau of Labor Statistics. Actuary jobs were rated in 2019 in the top 10 jobs by Career-cast and have continually placed near or at the top of the rankings for the past 10 years. The minor in actuarial science prepares students for the first two actuary exams and provides them credit for validation by educational experience in accounting, economics, and statistics courses. The following diagram shows the career path in actuarial science. All UMKC students can add the actuarial science minor to their degree plan.

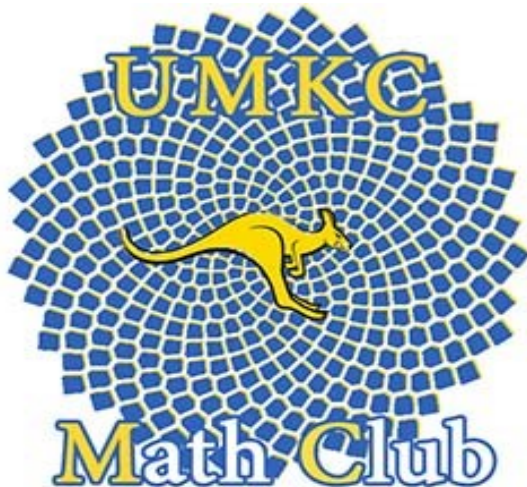


Student Organizations affiliated with Mathematics and Statistics



The purpose of the UMKC Chess Club is to provide a friendly environment in which its members may play, instruct, and discuss chess. The Chess Club will supply chess sets and clocks for its members. It also holds at least one open tournament annually, for all interested UMKC Students and future potential students. The Chess Club is dedicated to advancing chess by offering instruction to all UMKC students and future potential students.

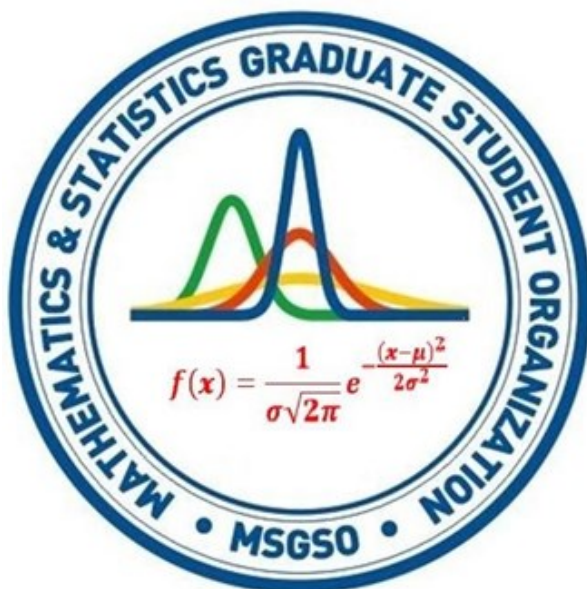
Find out Chess Club meetings and activities at: <https://roogroups.collegiatelink.net/organization/ucc/documentlibrary>



The UMKC Math Club promotes interactions between faculty and undergraduate students; provides math-related activities such as problem of the week, math movie nights, and math contests; invites math alumni and various employers to give insight into the current math job market; facilitates communication between math graduate and undergraduate students.

Location: Manheim Hall Room 205 C

You can learn about Math Club meetings and activities at <https://roogroups.collegiatelink.net/organization/umkcmc>



The purpose of MSGSO is to represent the graduate student body of the UMKC program of Mathematics and Statistics; to provide a forum for graduate student opinion; to act as a voice for the graduate students in matters of mutual interest to graduate faculty and students; and to promote professional interest and fellowship among the graduate students.

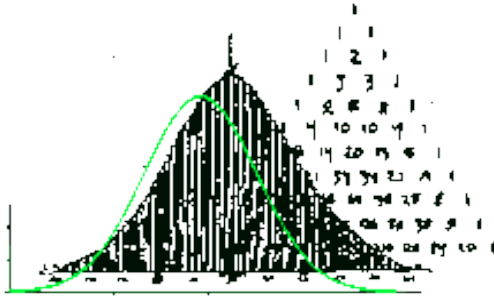
Location: Manheim Hall Room 205 C

You can learn about MSGSO meetings and activities at <https://roogroups.collegiatelink.net/organization/UMKCMMSGSO>

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Visit our Website at [Mathematics and Statistics | Science and Engineering | University of Missouri - Kansas City](http://www.umkc.edu/mathstat)

Become a Member!

We encourage you to register as a member of the **UMKC Alumni Association**. Just go to the UMKC alumni website www.umkcalumni.com, click on the tab at the top of screen called "MY PROFILE/LOGON", and follow the instructions.

If you would like to donate to UMKC, please visit the **UMKC Foundation** web pages at <http://www.umkc.edu/umkc-foundation/>, where you will find links to Gift Planning, the Alumni Fund, creating a scholarship, and so on. **Our department is one of the few with no department scholarships for our undergraduate majors, and you might be the first to initiate one.**

Send Us Your News!

We're always happy to hear from you. Send a paragraph or two and let us know what you have been up to. Pictures are welcome.

Please include your name, mailing address, and email address so we can contact you.

Send to: **Dr. Richard Delaware** at delawarer@umkc.edu
 or

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