



UMKC RooMath News

Department of Mathematics & Statistics Newsletter

<http://cas.umkc.edu/Math>

Volume 12, Issue 1

Fall 2019

Greetings from the Department Chair

Majid Bani-Yaghoub

As the new chair of the Math and Stat Department, I am thrilled to welcome you to the 2019-2020 academic year. Continuing a long-lasting tradition, we support the members of our diverse local and global community within and outside of the department as they present research and share insights on improving teaching efforts. Many ongoing activities organized or sponsored by the department have profoundly influenced students, faculty and the community at large. A few of these activities include the KC Math EXPO which has occurred annually for about three decades. The Math and Stat Research Day, Integration Bee and Pi Day have been organized annually for more than five years.

Our department has gone through some changes over the last few years. Prof. **Yong Zeng** has recently taken a leave of absence to serve as a director at the National Science Foundation. Our former chair, Prof. **Eric Hall** has started his sabbatical leave for this academic year. I thank him for serving as the department chair for more than five years. Prof. **Xianping Li** has accepted a new position at the University of Arizona. I wish him much success in his new department. He will keep ties with our department by supervising two Ph.D. students and serving as an adjunct professor. Meanwhile, Prof. **Hristo Voulov** retired in the summer of 2018 leaving us a legacy of rigorous, enthusiastic teaching

in ordinary differential equations. It is also necessary to mention the departure of Prof. **David Spade** in 2018 when he joined the Math Department at the University of Wisconsin-Milwaukee. Prof. Spade was a great colleague during his time here. He trained more than 20 graduate students and taught many stat courses at both undergraduate and graduate levels.



While several faculty members have temporarily or permanently left the department, I am delighted to share that two dedicated assistant teaching professors have joined us in fall 2018. Dr. **Nadeesha Mawella** came to our department from Kansas State University with a Ph.D. in Statistics. Her research has focused on misspecifications in homogeneity tests for zero-inflated models. Dr. **Said Shehab** received his Ph.D. in Algebra from the University of Poitiers, France.

In our efforts to expand interdisciplinary research in health and biomedicine, four research scholars have joined our department through courtesy appointments. Research Professor **Steve Simon**, Assistant

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Professor **Sam Ye**, Associate Professor **An-Lin Cheng** and Associate Professor **Vincent Staggs** are all statisticians who will work in conjunction with our graduate students to support several research endeavors. In addition, Dr. **Malinee Konboon** who earned her Ph.D. in our department, has returned as an Adjunct Assistant Professor of applied mathematics. She will continue her research in the area of mathematical epidemiology and related fields.

With regard to our academic programs, we are enthused about our new minor in

actuarial science which begins to be offered this semester. This minor prepares the student for the first four actuarial exams. It is expected that the student pass the first two actuarial exams before graduation thereby adequately qualifying them for an entry level actuarial position.

One of the highest priorities in the new academic year is to increase student retention and recruitment. I have no doubt that with the continuing dedication of our faculty members, graduate teaching assistants and staff we can increase the number of students entering and continuing in our department a year from now.

Greetings from the President of the Math & Stat Graduate Student Organization

Greetings! My name is **Bryan Harris**, I'm the President of the **Mathematics and Statistics Graduate Student Organization (MSGSO)** at UMKC. I am also a Ph.D. student in the Department of Mathematics & Statistics, and I'd like to welcome you to the start of the 2019-2020 academic year! It is an honor to be a Roo and a Roo that practices mathematics at that, and I hope you all feel the same way!



MSGSO is a student run organization through the UMKC Office of Student Involvement that serves to enhance the graduate student experience in mathematics beyond what is taught in the classroom or read out of the textbook, with a goal of fostering friendships and professional relationships between other graduate students and the mathematics faculty. We also work closely with the Math Club (see below). MSGSO will be hosting several events throughout the school year including a semester kickoff, invited seminar speakers, speakers from our own department and several social events to help everyone destress and get to know each other a little better. The first event we will hold this year is the Fall 2019 semester kickoff dinner. Please be on the lookout soon for further announcements.

We will be sending out emails periodically to inform the department of upcoming events and talks so please keep an eye out for us! If you use Facebook, feel free to like the offi-

cial MSGSO Facebook page! (search for "UMKC Mathematics & Statistics Graduate Student Organization") the page has been relatively inactive as of late, but we are bringing it back this year! We will periodically post things related to UMKC mathematics, and mathematics in general, as well as post pictures of our events for you to share!

If you are new to UMKC, welcome, and I hope to meet you soon! If you are a returning student, hopefully you had a good summer vacation, and I'm sure you are just as excited as I am to return to class! Good luck this Fall with your studies!

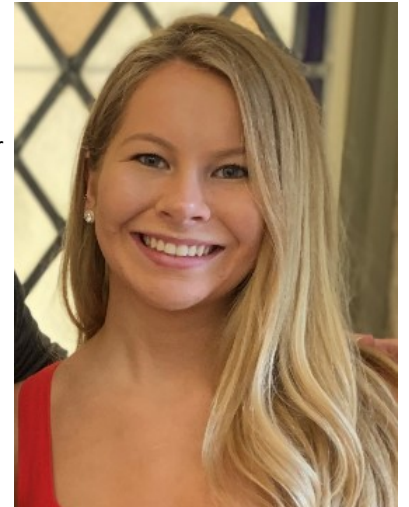
Bryan Harris

Graduate Teaching Assistant & Ph.D. student
President of the UMKC MSGSO

Greetings from the President of the UMKC Math Club

Math Majors,

I just wanted to take a moment to introduce myself as the president of UMKC's Math Club. This is my sophomore year as a math major at UMKC and I am excited about the year ahead. My vision for Math Club this year is to have meetings every other Monday at 10 AM where we can get together and explore different branches of mathematics in a more casual setting. I also hope that these meetings will create



a space for students to collaborate on homework problems outside of class. The first of these meetings will be in Royall Hall 203. (Note: The location is subject to change and a notification will be sent out accordingly.) There will also be a few events throughout the year such as a first semester party, an Integration Bee and Pi Day to name a few. I wish all of you a great academic year and I hope it is off to a good start!

Sincerely,

Ashley Parmenter, Mathematics Major
President of the UMKC Math Club

Apply for Jedel Scholarship during October 2019-April 2020
<https://cas.umkc.edu/become-a-student/scholarships/current-student-scholarships/>

Summer Internship as a Financial Analyst at Best Buy

I am **Cody Halverson**, a Senior going into my final semester at UMKC. This summer, I spent my time in Richfield, Minnesota, interning with Best Buy's corporate office as a financial analyst in the transportation and supply chain department. Although not a traditional mathematics internship, the role I took on at the company did require the use of my background in mathematics and statistics, and per my request, I was able to assist in and have visibility to some of the projects that were being worked on by departments and individuals in roles more tied to traditional statistics.



I greatly enjoyed my time at the corporate office and learned so much during my employment. It was great to have exposure not only to the corporate world but also the ways mathematics and statistics are used in a business setting. Throughout the summer, I worked 40 hours a week with most of my duties being around forecasting and projecting trends in large sets of data. Some of my major projects included bringing weekly visibility to our consolidated transportation data, which includes everything from driver and trailer utilization to miles driven between stops contained in tens of thousands of invoices, as well as discovering and analyzing opportunities to improve our outbound delivery process, which is the process of taking a product from a distribution center to a store warehouse.

One of the most exciting opportunities about working in this department was that the company had implemented a new way of tracking volume transported over the last couple periods, and this was the first year that we could compare year over year data effectively. Which meant that I was given the first access to a plethora of data and analytics that no one else had done much with, aside from look at growth rates. I was given nearly free reign to analyze any trends that appeared throughout the year, which required substantial modeling as well as statistical analysis, especially in the form of regression analysis.

While at the company, I was also able to learn about the careers of other full-time employees, some of whom were working in positions and using mathematics in quite innovative and interesting ways. For instance, there is a whole team under

the risk management department fully dedicated to disaster recovery plans. Their jobs include analyzing data and action plans to create a response for any catastrophic loss that could occur, from a data leak to an earthquake. I used a lot of the networking opportunities I had to learn more about some of the careers that interest me, such as their actuarial department that works with Geek Squad services and warranties. Even in areas like this, where I assumed that I would know most of the duties, there were surprises to be found. For example, I learned that actuaries at the corporate office often have tasks assigned to them that have little to do with traditional actuarial work but fall into their skillset due to their expertise in mathematics and statistics. One specific example I was given included looking at what percentage of gift card balances go unused as more years pass.

During the rest of the summer, I worked as an appliance sales associate under the Pacific Kitchen and Home brand of Best Buy, which specializes in premium major appliances. It was this position that also allowed me visibility to the internship positions available, despite no recruiting in our area.

Overall, I greatly enjoyed my time with Best Buy's corporate team, and I look forward to whatever new opportunities await me after graduation.



Important Notes:

- 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.

My Experience Summer 2019 Participating in an REU Pro- gram — Grace Reesman, Mathe- matics & Physics major

This summer 2019, I had the opportunity to participate in a 10-week REU (Research Experience for Undergraduates) program in physics at Ohio Wesleyan University. This program is designed to give students a chance to learn about and participate in research areas not available at their home institutions. Going into this experience, my intention was to get a feel for what it was like to do research, as well as test out a specific research area.

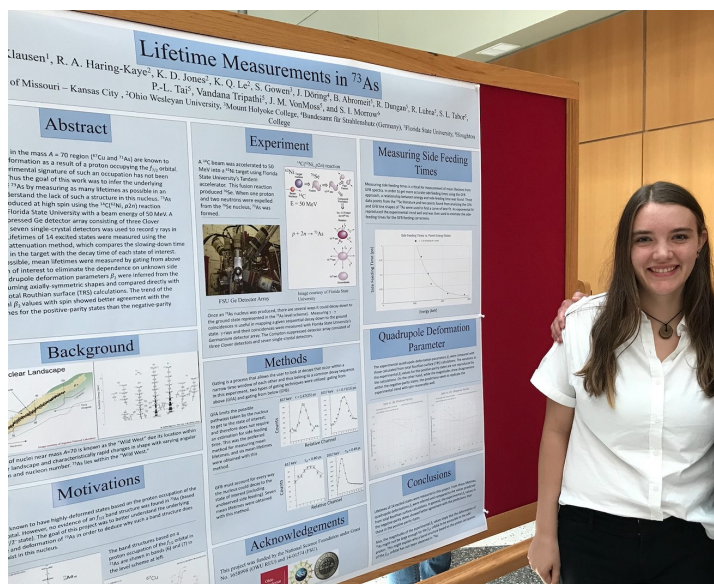
The application process began last fall with researching and refining my interest. I began applying for different programs over winter break, as most of the applications were due in January or February. The applications all required an essay, along with at least one letter of recommendation. I applied to about ten programs and was offered a position at three. I chose the project I was most interested in and curious about, which ended up being measuring mean lifetimes of energy states for nuclei in the so-called “Wild West” region (which is the mass region, also known as nucleon number or atomic weight, of $A=70$, in my case ^{73}As , Arsenic) with gamma ray spectroscopy.

When a nucleus (such as ^{73}As , Arsenic) is created in a reaction between other nuclei (here, ^{14}C , Carbon, and ^{62}Ni , Nickel), it is in an energetic state, although it “wants” to be in the lowest energy state possible. In order to attain that lowest energy state, the nucleus must get rid of the excess energy in some way, and it does this by emitting gamma rays, which is a type of light. By studying these gamma rays, we can learn more about the nucleus, ^{73}As , including how long it occupies certain energy states, called lifetimes. From these lifetimes, calculations can be performed in order to infer how the nucleus is shaped.

Most of my days were spent working with data from spectra and simulations on a computer in order to obtain these lifetime measurements. At times, I found the work tedious, as it required me to write down counts (number of times a gamma ray hit the Germanium detector at or around a specific energy) for each analyzable peak in the spectrum and repeatedly run and rerun the simulation after small alterations. However, in these times, it helped to remember the mechanisms through which the data was obtained, and how and why we are able to understand it. Research in any field is not always going to be exciting, and it was important for me to remind myself of my own curiosity and acknowledge the compelling physics and mathematics behind, perhaps speciously, tedious tasks.

I worked most closely with two other undergraduates

who were students at Ohio Wesleyan University. Our projects were similar, with the main difference being that we studied different nuclei; we were therefore able to work together when we happened upon problems. In addition, all of us mathematics, astronomy, and other physics REU program participants attended on a weekly basis professional development seminars



and a presentation from one of the research groups in which they discussed their progress. Everyone I interacted with during these meetings appeared to go into the summer with a general understanding of what they would be studying, but were able to acquire more knowledge about the specifics of the research field throughout the summer. For example, having never had a course in nuclear physics or quantum mechanics, I went into the summer with a basic understanding of classical mechanics and modern physics. Yet, throughout the summer, I acquired research-specific information, including learning how to use software to analyze spectra, how to use necessary simulations, and what the processes represent physically. I imagine that others participating in the REU program had similar experiences.

During the latter stages of the program, my research group traveled to Tallahassee, FL to use Florida State University's tandem particle accelerator by collecting data for further lifetime measurements and deformation parameters in other nuclei. Our job was to man the “tandem” during the eight hours from 6:00 pm to 2:00 am to ensure it was functioning smoothly (it operated at 9 million Volts and was prone to sparking), fix it when it wasn't, confirm that data was being acquired from all Germanium detectors, and begin preliminary analysis of spectra. On the first night we were there, a valve near the detector array malfunctioned, causing immense radiation build up at the failed valve, instead of at the target location. Though this was certainly an unfortunate situation as it stalled our data acquisition for the night, I enjoyed the opportunity to operate a particle accelerator and use what I had learned in classes to solve a problem.

The REU program is certainly a resume and skill builder, though I found it to be of greater significance. While in the end, I decided that the research area in which I participated was not one I want to pursue later in my academic career, there were many valuable and enjoyable aspects of this program, including the opportunity to construct a better understanding of what field I want to pursue. Yet, perhaps the most satisfying for me was being able to contribute, even in a miniscule way, to human knowledge and understanding by delving into an unsolved problem.

How to Survive Grad School 101 — *Shelby Bell-Glenn, B.S. Mathematics 2018*

Having just survived my first year as a graduate student at the University of Kansas Medical Center, when I think of what grad school is like, there are a few words that come to mind: intimidating, difficult, and time consuming. If those words aren't enough to give you an idea, let me paint a picture for you. Remember when you were a kid and used to watch Alice in Wonderland and laugh at the rabbit who was always "late for a very important date" and also a little crazy? Welcome to grad school.



Step one to survive: make friends. Your colleagues at school are your lifeline. There will be times when someone knows more than you about a topic and, chances are, they want to help you! In grad school it is not about seeing who can get the best grade. It is about learning as much as you can, and helping each other do it. Having this mindset will not only help you finish your assignments more quickly and get better grades, but it will also reduce your stress. For me, my colleagues have become some of my best friends and we spend a lot of time together at school as well as off campus.

Step two to survive: reach out to your professors. This step is pretty self-explanatory, but important nonetheless. Your professors are there to help you, and want you to succeed! I haven't met a professor in my program yet who hasn't wanted

to help me in any way they can. I for sure have been going to my professors' office hours much more regularly than I did during my undergraduate career.

Step three to survive: read your textbook. I think I read more of my textbooks in my first year of grad school than I did in all four years of undergrad combined. Material in grad school is harder, and it has been rarely the case that my grad school class notes provided me with the best understanding I could get about a subject.

Step four to survive: take care of yourself. Mental and physical health are just as important as good grades and knowledge. Setting aside time for fun or relaxing activities, getting enough sleep, and eating well are all things that will help manage stress levels. Not only that, but it will also help you perform your best.

Step five to survive: manage your time wisely. I think every single thing I did in my first year of grad school took longer than I budgeted time for. I started giving myself at least double the amount of time I thought it should take me to complete something just so I could stay on track. I also found that the old "you should study 3 hours outside of class for every one hour in class" tactic was just not enough. It probably ended up being more like 5-6 hours outside of class for every one in class.

All of these may be steps you already follow, but remember: just like undergrad was a step up from high school, grad school is a step up from undergrad. Except it's a much larger step. With that being said, I want to note that graduate school is not for everyone. So if you're thinking about applying, take some time to reflect whether that lifestyle is right for you. Ask your professors, ask your family, and ask your employers. If you're getting ready to graduate and head to grad school, good luck! It is one of the hardest things you will ever do, but it also one of the most rewarding.

My year in the Post-Bacclaureate Program for Women in Math at Smith College and My Summer in the Voting Rights Data Institute Program — *Jasmine Noory, B.S. Mathematics 2018*

There is so much I could say about my 2018-2019 year in the Post-Bacclaureate Program for Women in Math. First of all, the year-long program sponsors women who have completed an undergraduate degree and who intend to pursue a graduate math program in three types of activities: taking math courses, creating original research, and fostering mentorship with faculty members.

It is a program that intends to make participants into competitive applicants for graduate school. It was a great option for me because there were courses, like complex analysis and modern algebra, that were not available to me during my undergraduate studies (for scheduling reasons) but were necessary to meet eligibility requirements for most graduate programs. I was able to complete these requirements in the year that I that attended, and successfully apply to a graduate mathematics program; I've accepted a PhD offer at the University of Minnesota Twin Cities, which I will begin in fall 2019.



Overall, the program boasts a solid foundation. Smith College is part of a five-college consortium, so instruction for a large selection of courses is available almost year-round. The program's emphasis on research and mentorship is an invaluable experience for students with the particular desire to attend a graduate math program. Relationships with program directors and advisers happen organically. Program directors conduct a weekly, small-group dialogue, with guests, to inform students of the experience of graduate school and careers in mathematics. Moreover, weekly or biweekly meeting with research advisers foster organic relationships. There is a range of topics to study and research in the program like number theory, combinatorics and geometry, knot theory, statistics, topological data analysis - TDA, and applied math. (There is a new faculty member that studies the applications of knot theory to biochemistry- so cool!) My research topic was in TDA, where I looked at progressions of algebraic structures found in a metric used in persistent homology. Participants present their research findings at conferences, including the Joint Math Meetings. Having experience researching and presenting at conferences, and more importantly having people that can vouch for your abilities, give participants a competitive edge when applying for graduate school.

[Some more information that you may share with in-

terested women: there are two admissions periods, in the fall and spring. Deadlines for fall applications are in mid-March and deadlines for spring applications are in mid-October. The directors, Patricia Cahn and Julianna Tymoczko, are good people to contact. I am also available to answer questions for anyone who is interested. Here is a link [about the program](#), and another link on [How to Apply](#).]

As for my summer 2019, the Voting Rights Data Institute (VRDI) gives their research fellows a chance to explore a broad range of cross-disciplinary topics on a week to week basis. This was a 6-week summer program of the Metric Geometry and Gerrymandering Group, a Boston-based research group spearheaded by mathematician Dr. Moon Duchin and computer scientist Dr. Justin Solomon. I was especially animated by this opportunity because the group works in the intersection of my current mathematical interest and lifelong curiosity: stochastic processes and civil rights/law.

The projects I worked on involved developing a score which captures the geography of splitting polities in a discrete context; experiments in social choice theory which captured voting outcomes using ranked choice voting data sets and demographic breakdowns of a polity; developing and optimizing a metric on the space of district plans, which we proved existed; considering the impact of the census citizenship question on seat outcomes, particularly in Georgia, using outlier analysis. It was a very diverse program in topics and people, which is the strength of the program. These were four projects of the approx. 20 projects that were executed, and there were fellows of all levels - from rising first years to PhD graduates. I hope to continue learning and experimenting with social choice theory and participating with the group, especially in light of the Supreme Court ruling this summer. It is an enriching program, and because of its relevance to current politics the atmosphere is very exciting. I really encourage math students of all levels to apply.

Beyond the B.S. — Breanne Dustin, B.S. Mathematics 2002, M.A. Education 2005, M.S. Mathematics 2006

I graduated from UMKC in May of 2002 with a BS in Mathematics and Statistics. That semester, I was one of a half-dozen students at UMKC earning this degree. Four years prior, I entered college with a declared major in engineering and I realized almost immediately that the only classes I was enjoying were my math classes. So, I switched. I had never really researched what types of jobs I could get with a math degree, and once I completed my Bachelor's I felt a little lost. I definitely didn't see myself going out and applying for corporate jobs, and there was absolutely no way I was going to grad school (I lacked confidence and I needed a break).

It was at this point that I seriously considered teaching. It seemed like a rewarding and stable job, and I didn't have any other ideas, so despite my burn-out I enrolled in some education courses at UMKC and I started my journey to get certified to teach high school. I learned that I could pay graduate rates for all my classes and work toward an MA in Education while getting certified to teach. Score! My final semester of my certification involved student teaching at North Kansas City High School. It was very challenging, but I had a wonderful experience and it was there that I decided that I really liked this teaching gig.



I earned my MA in Education in the winter of 2005. I got offered a job teaching at NKC High, but somehow **Dr. Delaware** knew this and called me the same day I got that job offer and encouraged me to apply for a graduate teaching assistant position (GTA) at UMKC. I am honestly not sure why I chose the GTA over the high school position, but I'm so glad I did. The GTA position at UMKC was incredible. It was frightening getting up in front of college students, but I got a ton of positive feedback and I became more confident and started to think of myself as a good teacher. I held this position for two years (along with taking graduate level mathematics classes) and in 2006 I received an MS in Mathematics.

After graduation, I stayed on as an adjunct at UMKC (off and on). I loved being in the classroom, but I was getting bogged down by the time spent grading and planning outside of class. I was so meticulous that it would take me hours to plan lessons and even longer to grade. After awhile I decided that I might be happier doing something else and I quit teaching in 2011.

The next three years or so were muddled with random

forays into the corporate world (insurance, mortgage titling, appraisal, etc). Nothing was high paying as an entry level employee, so I was always looking for the next thing. I even took some prerequisites for nursing school and some accounting classes, but that all fizzled out. I wasn't happy doing any of this. I had worked in restaurants while a student, and eventually I returned to that work to make ends meet while I figured out my next move.

Prior to any career epiphany, I became pregnant with my first child in 2013. The late nights and long hours were not going to work for me, so I decided I had to leave the restaurant industry. I had been doing some private tutoring since leaving UMKC and I really enjoyed it, so I applied to work at the tutoring center at the Metropolitan Community Colleges (MCC) - Blue River. It was part time work, but it felt really good to get back into mathematics and work with students again. I decided to try to get some classes to teach at MCC and in January of 2014 I began working at MCC-Longview as an adjunct instructor. For five years I taught classes (mostly evening and weekend) and stayed home with my two boys (I had another child in 2016). I loved teaching at Longview; after a few years away from teaching I had a different approach and mentality. I got smarter about grading and planning and learned how to better balance teaching with my life outside of the classroom. My evening and weekend classes brought me many more adult learners than I had in the past and it was so rewarding to me teaching this population.

In the spring of 2019, a position for full time math faculty was posted on the MCC job website. I went ahead and applied, mostly for the experience interviewing. I had heard full time positions were hard to get into and most people end up applying more than once. I got an interview! And then I got the job! I started teaching full time this fall of 2019 and I could not be happier. I feel like I belong at MCC-Longview and I am so lucky that I get to help people reach their goals every single day. It took seventeen years and some twists and turns, but I finally feel like I am settling in and no longer searching.

*Math Major (now 2019 alumna)
Amanda Nethington wins 2019
HOM SIGMAA Student Paper
First Place Award & Lucerna
Publication*

Amanda Nethington, B.S. Mathematics 2019, won the national 2019 Student Paper Contest sponsored by the History of Mathematics Special Interest Group of the Mathematical Association of America (HOM SIGMAA). Amanda's paper is titled "**Achieving Philosophical Perfection: Omar Khayyam's**



Successful Replacement of Euclid's Parallel Postulate”.

See: <https://www.maa.org/node/1817470/>

It will also be published in the upcoming edition of *Lucerna* in early 2020. Her paper was supervised by **Dr. Richard Delaware** in Math 464 WI.

Recent Graduate Student Julia Parker will be Published on the MAA Site Convergence

Recent graduate student **Julia Parker** will have her Math 464 WI History of Mathematics paper "**Syllogism and Antilogism: The Work of Christine Ladd-Franklin, the First American Woman to Earn a Ph.D. in Mathematics**" published on the Mathematical Association of America site *Convergence* this fall. She is currently working on a Master's degree in Education, and is the part-time SI and embedded tutoring coordinator at Metropolitan Community Colleges—Longview this semester.



Other Math & Stat Major, Math Minor and Alumni News



Callie Lane, B.S. 2018, now studies at the KU Medical Center and after her first semester in fall 2018 wrote:

“My first semester was great! I like my classmates and the classes, and I have already been able to work as a student physical therapist in the clinic. I see people from UMKC on campus all the time, so that has been nice. The coursework isn't too difficult, so I am hoping it picks up as we take more classes. I'm looking into a few programs on campus to add to my schedule to get a bit more out of it, but overall it has been great!”

Daiwa Emmert, B.S. 2018, appeared on the UMKC TODAY site in February 2019 under the title “Empowering Girls in Math” <https://umkc.edu/news/posts/2019/february/empowering-girls-in-math.html> She writes to us that : “This fall, I am not only teaching algebra 1 and geometry [in high school], but I'm coaching volleyball to middle schoolers, taking graduate level linear algebra and real analysis [to earn a Master's degree in Mathematics], and trying to adjust to the married life. It is going to be insane!!!”

Current mathematics minor **Morgan Adrales** posted on Facebook September 6, 2019: “Just a quick life update for everyone: I officially accepted my full time offer to work as an Associate Software Engineer at Bentley Systems [a software development company] following my graduation this December! It feels pretty great to be able to have a job lined up so that I can focus on my studies for the rest of the semester. All the hard work is starting to pay off.”

On February 17, 2019, graduate students **Dustin Schmidt** and **Nicole Stovall** assisted Rockhurst University in their annual *Mathapalooza* event for high school students.

Whitney White, B.S. 2018, appeared on the UMKC TODAY site in April 2019 under the title “Undergraduate Research Provides Rich Experiences” <https://www.umkc.edu/news/posts/2019/april/Undergraduate-Research-Provides-Rich->

[Experiences.html](#) about the paper she wrote in Math 464 WI. She begins graduate school at KU Medical Center this fall.

M.S. 2016 graduate **Anna Riffe** just took on a fulltime position this fall as a Visiting Instructor of Mathematics at Avila University here in town.



Lucerna January 2019 published Math 464 WI papers by **Mastin Tapp** B.S. 2019, “On a Few Less Well-Known Problems from the Latter Part of Leonardo of Pisa’s *Liber Abaci*”, and **Whitney White** B.S. 2018, “Ostrogradsky’s Divergence Theorem”. See: <https://honors.umkc.edu/get-involved/lucerna/>

Melissa Menning, iPh.D. 2016 (advisor: **Dr. Liana Segal**) has been accepted as an AMATYC (American Mathematical Association of Two-Year Colleges) Project ACCESS (Advancing Community College Careers: Education, Scholarship, and Service) fellow, a “program to mentor and empower new mathematics instructors... to provide experiences that will help new faculty become more effective teachers and active members of the broader mathematical community.”



Summer Research Experience at Arizona State University

“I have been at Arizona State University this past summer. I did dark matter annihilation analysis research with my supervisor, a high energy physicist, Professor Matthew Baumgart. Through my research, I have learned essential skills in theoretical physics such as Python and C ++ computer language and Mathematica software.



I explored research interests in high energy physics and cosmology through my research, the seminars held in the ASU, discussion sessions and my interaction with many great graduate students. It was nice to meet many brilliant scientists. It was also nice to see how they are doing research in that field.

I expressed my interests to professors for contributing research in high energy physics last year via email and skype. Finally, I found Professor Matthew Baumgart and I appreciate that he gave me this opportunity.” Math Minor, **Cemile Arabaci**

Big Congratulations to Recent Math and Stat Graduates

The Department of Mathematics and Statistics congratulates the following recent graduates with a degree in mathematics or statistics.

Fall 2018

Pleasance Hope Mertz	Fangshen Zhang
Darcie Laren Sellers	Rachel Joy Talmadge
Whitney White	Kevin Alexander Woods
Jean Coltharp	Andy Reeves Johnson
Jacob Brandom	Logan Brett Fries
Alvynne Villacampa	Jia M Wang
Min Xiong	Damien Joseph Midkiff
James Rippee	

Spring 2019

Madison Marie Scott-Kerley	Sami Gul
Stephen Carrick	Mastin Alexander Tapp
Daniel Fager	Charles Howard Kremer
Timothy Ryan Phillips	Alyssa Studer
Vania Todorova	Tyler William Evans
Jared Everett Bell	Cash Elliott Hauptmann
Ian Wesley Hunter	Ly Ly Kim Lang
Mikeelie Marie Martin	Carrie Merritt
Fiona Morris	Mary Okafor
Sarah Shin	Rafah Albayaty
Ghayah Abdu H Alshari	Ahlam Ayed S Bindajem
Lauren Marguerite Beck	Mohan Krishna Doddala
Tahani Ali Omer	Dustin Eugene Schmidt

UMKC Math and 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. <https://cas.umkc.edu/math/degree-programs/fast-track-programs/>

Congratulations to the 2019-2020 Recipients of Jedel Scholarships: John P. Murphy, Kathryn Menta & Grace Reesman

The **Jedel Scholarship** amount is \$2,000 per semester. The Application Deadline is October-March (Click [here](#) to apply).

Qualifications: Students majoring in Math. Preference given to students with a combination of financial need and historical academic performance at UMKC. The fund will award 3 x \$4,000 scholarships per Academic Year.

The recipients of the 2019-2020 Jedel Scholarship are **John P. Murphy, Kathryn Menta, & Grace Reesman**. Congratulations to all three of them. We hope that you will apply for next year! Below, you can read about each of these students.

"I'm a senior studying to be an actuary. I've got two cats and have been trying to be more physically active recently. I transferred here from another university last year. UMKC's positive environment is really something valuable compared to the depressing atmosphere of other universities."

John P. Murphy



"I am a Physics and Mathematics double major at UMKC. My plan after graduating is to pursue a masters degree in mathematics and PhD in Physics and then do research in theoretical physics. I currently work as a supplemental instructor for Physics 250 and as a math and physics tutor with UMKC Tutoring."

Grace Reesman



"I am a senior student working towards a BS in Mathematics and Statistics and a BA in Criminal Justice. I should finished next spring. I plan on continuing next fall into the Statistics MS program here at UMKC. Ultimately, I would like to go forward to get my PhD in statistics and would like to use mathematical and statistical applications in solving crime, finding crime patterns, and other crime analysis work."

Kathryn Menta



UMKC Math & Stat Career Paths

We offer Math & Stat degrees with careers paths in Data Analytics, Actuarial Science, and Theoretical Math. According to payscale.com, the salary of a data analyst is between \$42k and \$80k per year; an actuary makes between \$50k and \$146K, and a math teacher's salary is between \$35k and \$74k per year.

BA/BS in Mathematics & Statistics (Career Path in Data Analytics): The students will acquire mastery in data analytics including data analysis & visualizations, machine learning, math & stat modeling, and coding skills. We are committed to preparing our students for the booming job market in data analytics (approximately 50 participating students).

BA/BS in Mathematics & Statistics (Career Path in Actuarial Science): In addition to problem solving, critical thinking and presentation skills, the students will acquire solid analytical and computational skills. There is a great job market for actuarial science with regional companies such as Lewis & Ellis and Lockton that actively recruit actuaries (approximately 40 participating students).

Join the UMKC Math Club! Membership is free and you will get to know many math majors, who participate in fun math activities such as Pi Day recitations and the Integration Bee. For more information visit: <https://roogroups.campuslabs.com/engage/organization/umkcmc>

Honoring contributions of the former Math Club president, Mastin Tapp

Mastin served as the president of the UMKC Math Club during 2018-2019, his senior year at UMKC. Through careful event planning and fundraising, he was able to provide an array of opportunities for members of the UMKC mathematics community to come together and grow. These events include an escape room challenge, Pi-Day, an Integration Bee and a mid-semester pizza party. Mastin also hosted biweekly meetings where he was able to build a strong tutoring network among mathematics students.



Mastin served as a volunteer at two Kansas City Mathematics Technology EXPOs. During his second EXPO, he was a presenter for one of the presenters. These EXPOs are an important event in the mathematics education community. They provide a platform for educators to discuss the newest technology in mathematics education and develop creative ways to incorporate these technologies into lectures. By volunteering, Mastin was able to help the Kansas City mathematics education community develop effective and modern teaching methods.

As the president of the UMKC Math Club, Mastin demonstrated excellence in leadership when he was faced with a lack of funding from the university. Rather than cancel the events, he found creative ways, such as playing music and helping people move, to raise the required money. This shows leadership, perseverance, initiative and problem-solving skills of the highest degree. Another example of Mastin's leadership would be the presentation he gave on his Math 464 WI mathe-

tics paper. During his time at UMKC, Mastin wrote a paper on the great mathematician Fibonacci. This paper was published by *Lucerna*, the university's journal for undergraduate research and Mastin was granted an opportunity to present his research. This shows leadership and initiative in his studies as a math major.

It is also important to consider that Mastin was able to accomplish all of this while maintaining a strong GPA, working part time at Barnes and Noble Booksellers during the school year and working for a non-profit lodge during his summers.

He chose to attend UMKC because the mathematics department seemed to be a good fit for him. During his free time, he likes to sing and play the guitar. He also loves to hike in the Rocky Mountains. After graduation, Mastin hopes to begin a career at Boeing as a Systems Engineer. He would like to thank **Dr. Richard Delaware** for guiding him through his research. He put countless hours into editing Mastin's work and helping him become a better mathematician.

Discussion of Step-by-Step Online Math Solvers Initiated by Dr. Bani

The digital and computational world is continuously evolving. Students use calculators and several computational software products on a daily basis. Although these tools can help students understand and visualize the math problems better, there are some concerns about the new generation of math solvers. For instance, "**Symbolab** provides automated step by step solutions to algebraic, trigonometric and calculus topics covering from middle school through college. Symbolab offers a wealth of smart calculators including: equations, simultaneous equations, inequalities, integrals, derivatives, limits, tangent lines, trigonometric equations, functions and more. <https://www.symbolab.com/about> "

Although there could be some educational value to the service provided by Symbolab, students often copy the step-by-step answers of their homework problems. I (**Dr. Bani**) personally find this a disturbing issue which harms the quality of math education. In the following I share responses provided by two colleagues last summer 2019, one away from UMKC, one here:

1. **Professor Brian Winkel, Director of SIMIODE**, <https://www.simiode.org/> in New York

Dear Majid,

Thank you for sharing your concern. Based on our correspondence and our conversation I believe we are of one spirit so I will share my deep and long held responses here.

Permit me a story. When I was in seventh grade in New York City schools in the 1950's I was required to learn to extract square roots BY HAND, using paper and pencil. Quite frankly, I enjoyed the algorithmic nature of it, the understanding of what a square root was and what it meant mathematically, or should I say arithmetically - and I was good at it! I learned how to use logarithm tables, characteristic and mantissa, and interpolation for more exact decimal values. I longed to learn how to use my father's slide rule, but went a liberal arts college route and never needed to use a slide rule.

None of these do I use, nor would I want my students to have to use except for historical sharing, e.g., I had a ten foot long slide rule and I showed them how to multiply - essentially adding the logs of numbers to get the log of the product, which was then offered on the scale of the device.

When I was in college and studied calculus I loved methods of integration, much more than the easy and unchallenging (rule based only) forward differentiation process. I loved the intrigue, the puzzle, even the "tricks" - again and I was good at it. We did not concentrate much in my course work on the meaning of the integral as a process of accumulation (I stress accumulation in lots of problems in which I get my students to "add stuff" - all kind of stuff, mass, area, arc length, money say present value of future investments), etc. arriving at integrals they could not conceivably integrate by hand, but so they see this accumulation process as a method of science and the mathematics of integral calculus as a solution for science, but not grinding out methods of integration by hand as helpful to any of us!

Having said all that I would not want my students now (nor did I do so when I was teaching up until I retired in 2012) to go through all that. Rather I would want them to use appropriate technology, e.g, a calculator. If I have to multiply numbers I will NOT do it without a calculator, probably because I could make errors in carrying and adding, etc. more likely than in entering the numbers in the machine. I would want them to do some methods of integration, but not for exams and I would want them to understand what a machine might have to go through to get the answer it offers, but then drop the skill and move to the machine, pretty much exclusively.

When I found out about Maple and was given access to a DEC VAXStation in the 1980's I found my teaching to be liberated because we could go way beyond the manipulations by hand and those implied limitations as the machine freed up the tedium and enabled more discovery, the doing of more meaningful and realistic problems, and the opening to both higher level thinking and more complex problems. Indeed, in 1993 I secured a \$100,000-NSF grant to construct a "Development Site for Complex, Technology-Based Problems in Calculus." All because I and my students were liberated from



Brian Winkel earned his degrees in mathematics (BS, MS, PhD) in 1964, 1967, and 1971, respectively, with his PhD from Indiana University in Noetherian Ring Theory. He is currently the Director of SIMIODE <https://www.simiode.org/>

the tedium of grinding out by hand derivatives and integrals. Then in founding an Integrated First-Year Curriculum in Science, Engineering, and Mathematics in which students took all their first year SEM courses in one 12 credit course, team taught by SEM faculty I found Mathematica on NeXT machines and continued to focus on high skills than manipulation.

I do not see an issue with **Symbolab** even. Frankly, I do ask my students to solve a $y'' + by + c = 0$ by hand (although I try to motivate where such an equation might come from - a key reason [SIMIODE](https://www.simiode.org/) exists(!)) but I want them to see the emergence, power, and meaning of eigenvalues from good old quadratic equations they may have seen and remembered, and if they do not, then I want them to see that from a sophisticated phenomena being modeled by this DE they can reduce the problem (a very important skill, i.e. reducing a problem to something simpler which is often lost when we focus too much on manipulation). I quickly turn to Mathematica to look at the form of the solution it give me, say for nonhomogeneous solutions to a $y'' + by + c = f(t)$ to see the steady state and transient solutions and where $f(t)$, the driving function (often force or EMF) plays a role and what it might mean for the solution or

output as in a circuit's gain due to input voltage $f(t)$ in an RLC circuit. We have little time to devote to grinding out by-hand techniques, there is too much else to get to, to excite and motivate students.

However, if one really wants to get students to do by-hand methods, for whatever reason - the method is relevant down stream, e.g., partial fractions because later in Laplace Transforms you can see the parts of a solution in the fractions in the frequency domain, for example, or it is a bit of history, it is good for the mind - much like puzzles, or your course director says, "DO IT!" To that I say "Fine," tell them they MUST learn such and such method and they must be able to do it on an exam without ANY aids. They can do it; we know, for we did it. And if they cheat on their HW and have Mathematica, Maple, Sage, Symbolab, or their TI calculator do it then they pay the price of an F. If playing your violin scales is important and you put on Joshua Bell, violinist par excellence, CDs doing scales so your mother hears "you" practicing, what good did it do you? NONE! However, I also believe that in light of the view I espoused above the teacher comes off looking archaic by requiring such things when technology can do them for us and we can go further and higher, with more confidence than if by-hand is the only way to proceed.

So I am all for technologies that do tedious things, and as I have said when technology was not present, when I was young, and square roots, logs, and methods of integration HAD to be done by hand and were intriguing, then I encourage teachers to move on beyond such methods and take their students to a higher level, beyond hand manipulating in the face of reliable technology.

Finally, not to belabor my point but I enclose some papers I have published which encourage colleagues to elevate their game and focus on something at a higher level than algorithm and manipulation, not because these are intrinsically bad, but because with technology we CAN go beyond and intrigue and motivate our students.

Take care and keep cool in Kansas City.

Brian

2. Teaching Professor Richard Delaware, UMKC Department of Mathematics & Statistics

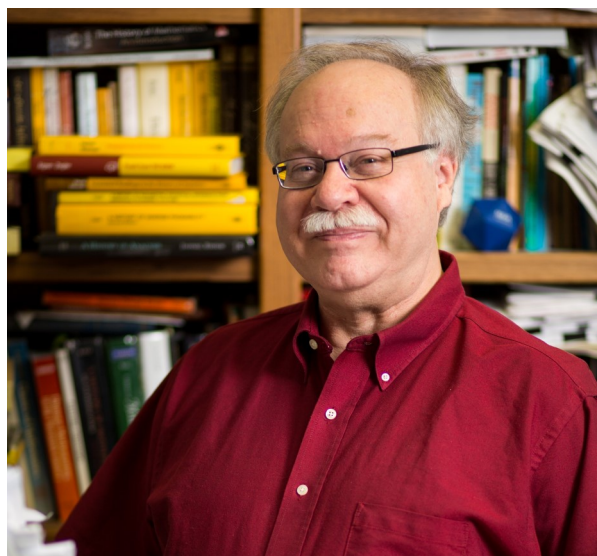
Majid:

The brief teaching answer is that we can't do anything to stop this bad behavior. Or maybe I should call it "ignorant", "naïve", or "unwise" behavior. All we can do is encourage our students to work homework problems for mastery, using either the help from MyMathLab or (best!) from us as instructors. We should create a study culture that encourages them to not be

frightened to make many mistakes and to learn how to fix them with our help.

The consequence for not doing so should be that if they do not, they will perform badly on our exams. Of course, this means we have to write new exams each semester because many of them get copies of previous exams. We must emphasize that exam grades are critical and form a high percentage of their final grade, which we already do now.

Also, for the few written assignments we collect, it seems to me if we are really interested in them improving the way they present problem solutions, thinking about preparing them for subsequent courses, the grading should be at least 50% on presentation to ensure they make an effort to provide



more than just a bare draft, sloppy solution.

None of this is new.

We have to convince them that this sort of cheating/laziness/avoidance on homework will crush them on exams, and make sure that is true in our courses.

We cannot force anyone to practice. We can only ensure that lack of practice is honestly assessed.

Richard D.

Math 464 WI Gets an Online Article published in Convergence

Richard Delaware wrote an article about **Math 464 WI History of Mathematics** and the remarkable success of its students in the annual HOM SIGMAA writing contest: <https://www.maa.org/press/periodicals/convergence/more-than-just-a-grade-the-hom-sigmaa-student-contest-fosters-writing-excellence-at-umkc>

Off-Campus and Online — Stephanie Van Rhein, Lecturer and Online Instructor

I graduated with a Master of Science in Applied Mathematics from Missouri University of Science and Technology in 2011 and landed my dream job teaching mathematics courses for the University of Missouri - Kansas City. I spent two wonderful years teaching a variety of courses on campus. I loved the classroom and the UMKC students. I learned that UMKC students, in particular, often have to commute long distances through heavy traffic, and a high percentage are non-traditional students who have to schedule their learning around work or family commitments. This led me to focus on modernizing learning for students. I started by incorporating technology in the classroom by recording my lectures and toying around with any type of hardware and software I could get my hands on. What I found is that the more ways you offer for a student to learn and communicate, the more chances the student has for success. Molly Mead (UMKC Manager of Informational Technology, and Instructional Designer) was an indispensable resource for learning and obtaining the technology I sought after. She was the one who first introduced me to online learning and I soon came to realize the amazing advantages it could unlock for students.



In fall of 2012, I taught my first fully online course. Little did I know, within the year my husband would be offered a position in Springfield, Missouri, 166 miles south of Kansas City, MO.

It was a very exciting time at UMKC. The university was putting together a team to expand online and distance learning offerings with the focus squarely on learning, and making the learning environment more accessible. The Mathematics and Statistics department was far from having enough of an online course load to justify a fully online position, but with the success of the online course that had been offered it was easy to see the value of offering more online course offerings. Fortunately, I have some great department colleagues that supported the online efforts being made at the University and department level. We wrote a proposal convincing them of the value of offering more online courses and a new online position, the first-of-its-kind in the College of Arts and Sciences, was created. I am the first faculty member to occupy that position.

I love having the opportunity to teach mathematics to a wider variety of students who might otherwise not have access to the courses, as well as the freedom and flexibility teaching online offers. I am very thankful for my colleagues, department chairs, and the UMKC online team for their guidance and support in delivering online courses. Being a pioneer is not easy; I now live in and work out of Springfield. I visit the main UMKC campus only occasionally. There are still days I really miss teaching face to face, collaborating with colleagues, and being more involved on campus. It was a difficult transition for me with feelings of disconnect and isolation.

I realized, however, that this was a great parallel to the experience of distance students. My transition has given me valuable insight into the struggles online students face, which has led me to develop, adapt, and use a new set of resources to support and connect more to my online students. My duties haven't changed much from when I was a face-to-face on-campus instructor. I definitely spend a lot more time in front of the computer. I create, develop, and teach online courses, serve on a variety of committees at the university and state level, keep up a range of certifications in online instruction, and attend a variety of professional development workshops each year.

This year will be my 7th year teaching full-time online and every semester I still feel that same enthusiastic excitement that a fresh group of students brings. Over the years there has been a continuous improvement of tools and resources to support innovative digital teaching while also improving the effectiveness of the virtual learning environment. It has never been a better time to teach online.

The Department hosts the Kansas City Mathematics Teaching Technology EXPO

Fri. & Sat. Oct. 4th and 5th, 2019

University of Missouri - Kansas City

<http://www.kcmathtechexpo.org/home.html>

The Kansas City Mathematics Technology EXPO is a forum for mathematics instructors at both the college and secondary levels to demonstrate how they use technology successfully in their teaching, to learn about new mathematics technology, and to discuss the philosophy and future of technology in the mathematics classroom.

5th Annual Mathematics and Statistics Research Day, held on Friday, April 19, 2019

The Mathematics and Statistics Research Day is an annual event celebrating student and faculty research, creative, and scholarly activities. This event is open to the public and promotes research in mathematics, statistics, and applications in various fields. The UMKC Applied Mathematics Group (<https://cas.umkc.edu/math/amg-act/>) organized the fifth annual Mathematics and Statistics Research Day. More than 15 graduate students and faculty members presented their research and discussed possible ways of collaborations. To see the list of speakers, titles and abstracts, follow the link: <https://cas.umkc.edu/math/msrd19/>

Celebrating Pi Day at UMKC

The **Math Club and MSGSO** organized and celebrated Pi Day on Thursday (March 14) from 11:00 to 1:00 in room 352 of the Miller Nichols Learning Center. More than 70 high school students attended the event. In addition to Pi recitation, music and pizza, **Dr. Richard Delaware** had an outstanding lecture about the long history and applications of Pi.



High School Students participate in the 2019 Integration Bee and Recruitment Event

Thursday, April 26, 2019

The Integration Bee contest is an annual integral calculus competition pioneered in 1981 by the Massachusetts Institute of Technology. As organized by **Dr. Bani** and members of UMKC Math Club, the Integration Bee was in two parts. The first part was a 10 minute multiple choice section of “easier” integrals to be done in 15 – 30 seconds.

This year, students of Park Hill High School (Park Hill School District) joined the Bee.

The top finishers in the first part competed in the second part. There was a page of more difficult integrals, generally requiring techniques learned in Calculus II. Students had 30 minutes to work as many as possible.



Student Organizations associated with the Department of 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.

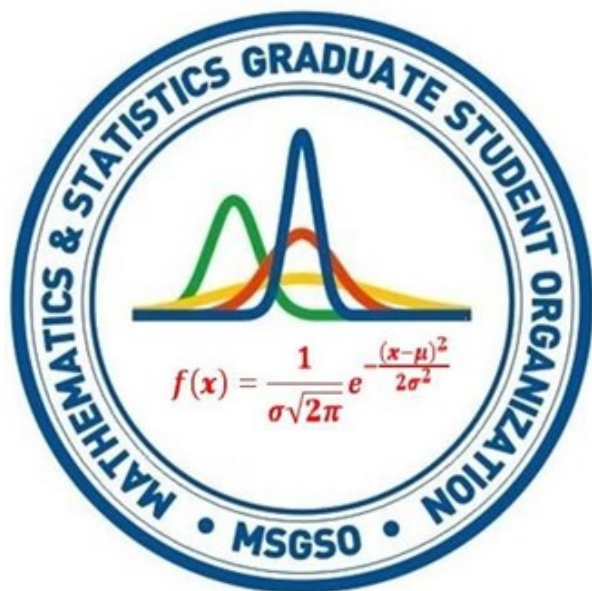
Find out Chess Club meetings and activities at: <https://roogroups.collegiatelink.net/organization/ucc/documentlibrary>



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 Department 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.

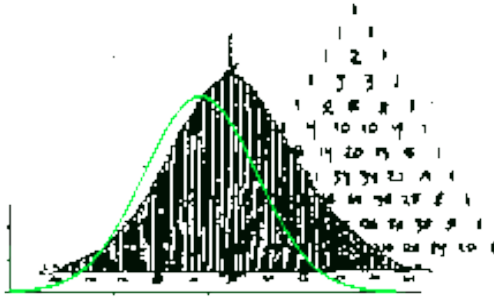
Location: Manheim Hall Room 205 C

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

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Type address here or use Mail Merge to automatically address this publication to multiple recipients.



Visit our Website at <http://cas.umkc.edu/Math>

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
 RooMath News, Dept. of Mathematics & Statistics, HH206, University of Missouri-Kansas City, 5100 Rockhill Rd, Kansas City, MO 64110

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