



RooMath News

Department of Mathematics & Statistics Newsletter

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

Volume 5, Issue 1

Fall 2016

Greetings from the Department Chair

Alumni, students, friends old and new, welcome!

Among the various accomplishments and developments in our department over the past year, I would like to mention first our new “fast track” five-year Bachelor/Master of Science program. Undergraduates can apply to the program (typically in sophomore or junior year), and if accepted can take courses during senior year which will grant credit toward both the BS and MS degrees. To complete both degrees in five years will take some planning, so interested students are encouraged to discuss it with their advisors in advance.



One year ago, the previous edition of this Newsletter announced the formation of our department’s Applied Mathematics Group, an interdisciplinary research effort. I want to congratulate this group on their activities since then. With funding from UMKC’s Funding for Excellence program, the group began the Interdisciplinary Applied Mathematics Program, involving talks and workshops with several distinguished guests, and scholarships for student research projects. You can read about these IAMP

scholarship recipients later in this newsletter. The program continues through 2016, so for updates see our department’s News and Events page, and the webpage for the Applied Math Group (<http://cas.umkc.edu/mathematics/amg/>).

It is my pleasure to greet you in my first year as Department Chair. I have been Chair since January (though I have sometimes been an interim chair previously), and I thank Dr. Noah Rhee

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for leading the department as interim chair in Fall 2015 while I was on leave.

Please enjoy the newsletter. And alumni, we are always happy to hear from you. There is contact information at the end of the newsletter, or feel free to get in touch with me, or any of your favorite faculty members.

Interview with Math Graduate, Kris Kathman

Kris Kathman was born in St. Paul, MN in 1980, and graduated from Tartan Senior High in Oakdale, MN in 1999.



She did NOT pursue college right away and had various (she says “dead end”) jobs until she decided to be a math teacher starting at Century Community College in 2006, and becoming a tutor there in 2007. In 2009 she graduated with an Associate in Arts degree and an Associate in Science in Education.

Due to her husband’s job she moved to Kansas City in 2009, but was not sure where to continue her education. She eventually chose UMKC, continuing tutoring there, and started working with the VSI program as a grader in 2011.

While pursuing her degree in Secondary Math Education, she took enough math classes to double major and earned her BA in Secondary Math Education and a BS in Mathematics in 2012.

She did her student teaching at Center High School in south KC during the 2011-2012 school year and decided to pursue her master’s degree in math, in order to have the option to teach at the college level.

She won a GTA position and taught College Algebra at least 7 times. While continuing to work with the VSI program and also teaching 2 sections of math readiness for the Bridge Program in its first year. She graduated with an MS in math in 2014.

Where are you working now?

I started teaching back at Center after graduating from UMKC and am currently there. I teach Algebra 1 and the dual credit College Algebra through UMKC. I still work with the VSI program although now it is under the HSCP program. Instead of grading, I am now the Math Coordinator for the program. What can I say, I just can’t leave UMKC.

Why did you choose UMKC?

I had no idea what schools in Kansas or Missouri were

accredited, or good schools, etc. I decided to focus my school search on state schools, and I chose UMKC because of proximity. As lame as those reasons are, I could not have been happier that I ended up at UMKC.

Why did you become a Math Major and a graduate student?

I ended up taking enough math classes while pursuing my BA in secondary math education and I was able to double major and get a BS in math as well. I decided to get my master’s degree after a rough semester of student teaching, and I chose to come back to UMKC because I knew I would receive the support necessary to reach my goals. I knew the faculty after taking classes with them for my Bachelor’s degree and I knew they would help me unleash my potential while earning my master’s.

How was your experience at UMKC Math Department?

I am NOT your typical student. I am needy and unsure, and I don’t feel like I am inherently good at math, but I work hard. I received the support I needed from the math department faculty to go farther than I ever thought possible. When I earned my BS in Math, I didn’t even think that was possible. Then Dr. Delaware really helped me believe that I was capable of earning a master’s as well. Without their belief in me, I never would have got this far.

You worked as the Content Specialist at UMKC Supplemental Instruction. Could you explain about this program and your experience?

The VSI program exists for rural schools and other small schools who don’t have a teacher qualified to teach various dual credit courses. For the math, they would watch videos created by Dr. Delaware back in 1998 and 2005, the teacher would answer student questions, assign and grade homework, and then they would take exams created by the math department. They would then mail the exams in to be graded.

I started off as a grader, grading College Algebra and Calculus exams for the program. After teaching College Algebra at UMKC for several semesters, we decided it was necessary to modify some of the exams and updated content to align better with what we were doing on campus. I continued to be the grader during my first year away from UMKC and was prepared to pass the torch on to someone else this year. Then the program changed departments and is now under the High School Dual Credit Partnership (HSCP) department. I became the Math Co-

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ordinator, taking on a leadership role and handling all communications with the schools while another person does the grading.

How's the job market for those who have a Master's degree in Mathematics?

For a teacher, the market is fantastic. I was worried that I had too much education and not enough teaching experience. However, I had several schools coming after me, trying to get me to interview with them. I was in a very good position.

How long did it take you to find a job?

I had a job lined up before I even graduated.

Could you tell us about your job characteristics, duties and career expectations?

At Center High School this year I have 100 students in Algebra 1 and almost 20 in College Algebra. My job consists of trying to teach teenagers how to be decent people while also teaching them how to do math. I spend a ton of time grading and planning lessons that they still find boring. But I keep showing up every day hoping some of what I say will stick.

Where do you see yourself in the next 10 years?

That answer varies from day to day. On rough days when the kids are driving me nuts, I am not sure. But in my heart, I believe I will still be teaching math at Center in 10 years. I plan on retiring from Center.

From your point of view, what is the most fascinating part of mathematics?

The light bulb moments that my students have when they finally understand something is the most fascinating thing to me.

Do you have any advice for those who are afraid of becoming a math major?

If I can do it, then anyone can do it. It helps to have faculty that believes in your abilities. It takes a ton of work and you have to be willing to work hard. Math is not a subject that allows you to show up from time to time. You have to show up every day, ready to tackle impossible problems.

Do you have any advice for those who want to get a graduate degree in Mathematics or Statistics?

Again, if I can do it, anyone can. You have to be willing to put in the work but it is possible. Plus, having the degree sets you up for success when you graduate.

What are the most interesting facts about the UMKC Math Department?

The faculty are real people. They have friends and personalities and they have jokes from time to time. Math people can be extremely intimidating, but if you are willing to talk to your professors, you will find them to be quite human!

For more Alumni News visit: <http://d.web.umkc.edu/delawarer/MathAlumniNews.htm>

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 2015

Chase William Crosby
Stephen Phillip Dewolfe
Quintin Boyd Foundopoulos
Raymond Dean Myers
Michael Raymond Collier
Joseph Aaron Davis
Binod Gurung
Amber M Hubbard
Melody Dawn Lloyd
Renee E Rowe
Peter Maurice Uhl
Christen Linda Ward
Eric Gonzalez
Jordin L Nelson
Rebecca May

Spring 2016

Douglas James Lagarce
Mehrddad Ostovar
Guerrero Pino Araujo
Jon Adam Sweeney
Ashlee Michael Espinoza
Hana S Siddiq
Emanuel Sierra
Yanan Ma
Melissa Christine Menning
Gillen Bridger Brown
Kelsi Lara Fetters
William Jacob Freeman
Mansi S Shah
Brad Waier

Bader Salamah N Alanazi
Racheal Nassimbwa
Yonghui Ni
Hao Zhou

Accelerated Calculus Courses for Engineering Students

In collaboration with Assistant Professor Antonis Stylianou of the Department of Civil and Mechanical Engineering in the School of Computing and Engineering (SCE), our department Calculus Coordinator Liana Segal created two new courses restricted (for now) to SCE students. In Fall 2016 we are introducing **Math 266 Accelerated Calculus I** (4 credit hours), and in Spring 2017 **Math 268 Accelerated Calculus II** (3 credit hours). Similar courses have become commonplace at universities that host the 300 ABET EAC (Accreditation Board of Engineering and Technology, Engineering Accreditation Commission) accredited schools of engineering in the U.S. Our Assistant Professor Xianping Li will teach both courses.

Undergraduate Students Win UMKC SUROP Grants

Undergraduate students **Ronald Morris**, **Scott L. Nickell**, **LeAnna Cates** and **Fatima Shariff** were awarded a SUROP (Summer Undergraduate Research Opportunity) grant. Congratulations to them and their faculty mentors Drs. Naveen K. Vaidya and Majid Bani-Yaghoub!

Our Department Administrates the HSCP Digital Program in Mathematics

From Fall 1999 - Spring 2015, the Office of Student Affairs supported the Video-based Supplemental Instruction (VSI) program, in particular providing for several rural schools in Missouri, without a UMKC High School College Partnership (HSCP) certified instructor, complete College Algebra and Calculus I video courses including course materials and the writing and grading of all exams. At the end of May 2015 the VSI program transitioned to the College of Arts and Sciences, and our department inherited management of the now-called HSCP Digital Program (DP)

in Mathematics. Over the 2015-2016 academic year one of our Master's graduates and teaching award winner **Kris Kathman** took on the administrative portion as the new HSCP DP Department Coordinator to communicate with the HSCP office and represent the department during semi-annual coordinator meetings, while the grading portion was filled by our current graduate student **Yonghui Ni**. Both these duties will now be performed by the new coordinator hired for 2016-2017, **Mike Round**, our Master's graduate from 2000.

Our Graduate Reports on Her First Year in Graduate School

Ryann McIntosh, our BS graduate in May 2015, was accepted into the University of Kansas (KU) Medical Center Biostatistics Graduate Program in Fall 2015. Here is her report of her first year experience there:

"Like many students I had no idea what I wanted to do when I completed my undergrad degree. Abstract math (analysis) was never my strong suit or what I was very interested in, so I knew that I wanted to do some sort of applied math graduate degree. Since I didn't want to move, I decided to pursue my degree in KUMed's biostats dept. While the department is great and there are some very strong professors there are several things that I wish I could have done to better prepare myself. If you are interested in doing applied mathematics, do yourself a favor and learn a programming language, like yesterday! I knew very little (seriously like VERY little) about programming, this set me back quite a bit the first year. Most of your homework will require you to use programming. Most people in biostatistics like R and SAS; I prefer R, but even learning Python through UMKC's comp dept. would really help. This probably seems obvious but trust me it's still taking me some getting used to; do not procrastinate! As an undergrad I put in very little effort and was still able to quickly understand concepts and make good grades, this will not be the case in grad school. If you're not already good at programming and/or analysis you will find that doing even simple homework problems will end up taking hours. This all doesn't sound super fun, but it is extremely rewarding to finally begin synthesizing some of the topics I had studied before entering the program. If you are interested in biostatistics I highly recommend KUMed's program. It's a very student focused depart-

ment, meaning they do everything in their power to help you feel confident and prepared to start working when you finish. If you join the department you will start with a week-long “biostatistics boot camp” where other students will explain some basic stats/programming concepts, as well as helpful hints for getting your work done. The program also offers classes that give those of us with no real work experience information about applying for jobs, resumes, how to give presentations in the work place, and ethics (this is HUGE, I feel like classes like this should be standard everywhere!) The department may be newer but with a strong foundation and affiliation with the hospital as well as other medical research centers, this is a great place for any student interested in statistics or applied mathematics to pursue their graduate degree.”

Graduate Students Win GTA Excellence in Teaching Awards

The winner of the 2016 departmental GTA Excellence in Teaching Award is **Colin Barker**. Also, **Jones Mutua** won a GTA Superior Teaching Award from the School of Graduate Studies. They both have outstanding teaching records. Congratulations to Colin and Jones!

Two Undergraduate Majors Published in the RHIT Undergraduate Mathematics Journal

For the first time expository papers written by our undergraduate majors, for Math 464 WI History of Mathematics in Spring 2015, have been published this past June 2016 in the latest issue of the peer-reviewed online Rose-Hulman Institute of Technology Undergraduate Mathematics Journal, volume 17, issue 1, 2016, located at: <https://www.rose-hulman.edu/mathjournal/v17n1.php>

The journal notes that “In order to maintain a high level of exposition, each paper must be sponsored by a mathematician familiar with the student's work and each paper will be refereed. The editor-in-chief will make the final decision for publication.” Richard Delaware sponsored each of the following two students.

Laila Awadalla, who graduated in May 2015, during this past academic year took graduate classes here, and in Fall 2016 will begin a Ph.D. program in mathematics at the University of Nebraska – Lincoln, wrote “Cantor’s Proof of the Nondenumerability of Perfect Sets”.

Abstract: “This paper provides an explication of mathematician Georg Cantor’s 1883 proof of the nondenumerability of perfect sets of real numbers. A set of real numbers is denumerable if it has the same (infinite) cardinality as the set of natural numbers $\{1, 2, 3, \dots\}$, and it is perfect if it consists only of so-called limit points (none of its points are isolated from the rest of the set). Directly from this proof, Cantor deduced that every infinite closed set of real numbers has only two choices for cardinality: the cardinality of the set of natural numbers, or the cardinality of the set of real numbers. This result strengthened his belief in his famous continuum hypothesis that every infinite subset of real numbers had one of those two cardinalities and no other. This paper also traces Cantor’s realization that understanding perfect sets was key to understanding the structure of the continuum (the set of real numbers) back through some of his results from the 1874–1883 period: his 1874 proof that the set of real numbers is nondenumerable, which confirmed Cantor’s intuitive belief in the richness of the continuum compared to discrete subsets (such as the set of natural numbers) and proved that there was more than one “size” of infinite cardinal; his 1878 proof that continuous domains of different dimensions (such as a one-dimensional line and a two-dimensional surface) surprisingly have the same cardinality; and his 1883 definition of a continuum as a set that is connected (all of one piece) and perfect.”

Chase Crosby, who graduated in December 2015, and has now been hired this Summer as an actuarial assistant at Blue Cross and Blue Shield of Kansas City starting his career as an actuary, wrote “An Examination of Richard Dedekind’s “Continuity and Irrational Numbers”.

Abstract: “This paper explicates each of the seven sections of mathematician Richard Dedekind’s 1858 essay

“Continuity and Irrational Numbers”, which he eventually published in 1872. In this essay, he provides a simple, completely arithmetic proof of the continuity of the set of real numbers, a property on which the validity of many mathematical theorems, especially those in calculus, depend. The intent of this paper is to familiarize the reader with the details of Dedekind’s argument, which is exceptionally easy to follow and self-contained. Although the real numbers were often imagined as points lying on an infinite line, as a calculus instructor in Zürich, Switzerland, Dedekind became deeply troubled by the need to reference geometry when teaching his students concepts such as functions and limits. This inspired him to develop a rigorous arithmetic foundation for the set of real numbers, in which, through the use of what are now called “Dedekind cuts,” he cleverly defines both rational and irrational numbers, and demonstrates how they fit together to form the continuum of real numbers. Alternative viewpoints and criticisms of his work exist, and one is briefly discussed at the conclusion of the paper, though it is noted that Dedekind’s essay accomplishes the goal he set for himself in its preface.”

We congratulate them both.

One Major Published in the 2016 UMKC Undergraduate Journal “Lucerna”

Our December 2015 graduate **Chase Crosby’s** expository paper “Midpoints in the Middle Ages” written for Math 464 WI History of Mathematics in Spring 2015, was published in the January 2016 volume 10 issue of UMKC Honors Journal *Lucerna*, and can be read at: <https://mospace.umsystem.edu/xmlui/handle/10355/48833>
Abstract: “While the centuries surrounding the turn of the first millennium in Europe are typically associated with ignorance, superstition, and the dismissal of scientific thought in the name of religion, many brilliant, forward-thinking minds of the Middle Ages— including those of the devoutly religious—often go overlooked. Among them, is that of a 14th-century man named Nicole Oresme, a French scholar who, according to Marshall Clagett (the author responsible for the English translation and

biographical information found in this paper), appears for the first time in the records of the College of Navarre in Paris, France as a student of theology in 1348. He would later be appointed Grand Master of his aforementioned alma mater, and eventually employed by King Charles V to translate various works of Aristotle into French. His time spent at the College would yield his most interesting and revolutionary contributions to mathematics, not the least of which was a cleverly detailed attack on astrology, a pseudoscience held to be true by many during his lifetime, and in fact, many still today.”

Three Graduate Students Join Rockhurst’s Mathapalooza

Representing our department, graduate students **Laila Awadalla, Rachel Cho, and Anna Riffe** participated in the Rockhurst University Mathapalooza event on February 27, 2016, for about 75 high school students. The Rockhurst Department of Mathematics Chair Zdenka Guadarrama described the event as follows: “At Mathapalooza students participate in a mathematics-jumping session (a sort of speed dating for mathematics and careers in mathematics). Students are assigned to a group of four or five students, and with their group they rotate through a series of mathematics activities in areas of mathematics that they not typically have an opportunity to explore in high school. Interspersed among the activities they have meetings with professionals working in mathematics related careers who talk to them about what they do, and how they apply mathematics in their field. There are also stops at which they get a chance to visit with mathematics students who can tell them what studying mathematics in college or graduate school is like first hand, and answers any questions they may have for them.”



Students Enjoy Active Learning “Board Days” in Math 301

During Spring 2016, Dr. Delaware continued his scheduling of “board days” in Math 301 On Solid Ground: Sets and Proof, our first course for majors and minors on understanding, reading, and writing proofs. Three such days were held, on which students usually in pairs went to the boards all as a group for 75 minutes to prove different theorems posted there around the room, and afterward explain their work to the entire class. Here are responses from two of those students:

Damien Midkiff: “I am so glad that I have a chance to comment on the board days because I LOVE them! I participated in all 3 board days this semester and wish we could do more of them. I learn the most about mathematics when I actually DO mathematics. One of the challenges in studying math is that, as a student, I am expected to sit and learn passively all day long... While I understand that lecture can be useful in communicating a lot of information in a short time, I do not usually learn much from this method of teaching. It is really when I get home and start to wrestle with the material that I learn the most. What is so wonderful about the board days is that they not only give me a chance to start to tangle with the material, but they allow to do this under the guidance of a teacher and other students. This is like the best of both worlds to me. I get to DO mathematics *with* expert advice. Also, my fellow classmates, sometimes help me a great deal. Another student can sometimes communicate how to do something in a different way than the teacher and provide exactly the kind of insight I needed. Additionally, the board days also provides a much needed change of pace. The days can sometime drone on in monotony. A board day is like a breath of fresh air. I understand that board days take a substantial amount of time to execute, but, in my opinion, it is time well spent.”

Shelby Bell: “I very much so enjoyed the board days. I participated in all 3 board days this semester and got a lot out of them for many reasons. One of those reasons being it was nice to work with my peers, especially those I hadn’t met yet because other people look at solving problems very differently than I do so it was refreshing to see someone else’s

perspective and learn from how they would approach a problem. Another reason I enjoyed the board days was because of the challenge, some of the problems on the board were somewhat difficult to get through, but it helped us better prepare for the test. Also if we were to get stuck, you [Dr. Delaware] were there to help nudge us in the right direction, as well as let us know when and why we were wrong if we were heading in the wrong direction. I also liked the fact that we had to explain our answers to the class after we were done because that helped the class understand what we were thinking, and it also reinforced our own understanding of the problem. Lastly, it was a nice change of pace to get on our feet after learning something new in lecture and try it. Even after the board days were over it was a nice change of pace to have all these worked out problems to try out ourselves and reference to see if we were on the right track. I think it would be very beneficial to add these days to other classes and I think other students will get a lot out of them as well!”

Graduate Student’s Summer Internship and Publication

Xing Song is a Ph.D. student under the supervision of Professor Kamel Rekab. She has been successful both in academic research and industry. In addition to publishing in peer reviewed journals, Xing is currently working in the Global R&D division of the RGA (the Reinsurance Group of America) on developing and refining some predictive regression or classification models. “Currently, we are working on an underwriting model for identifying smokers/non-smokers”, she says.



Graduate Student’s Research Publication

Master's student **Abhishek Mallela** successfully published his master project work in the peer reviewed “Journal of Computational and Applied Mathematics”. Other co-authors in this paper are his faculty mentor Dr. Naveen Vaidya and collaborator Dr. Suzanne Lenhart (UT – Knoxville).

Big Congratulations to the recipients of the Interdisciplinary Applied Mathematics Scholarships and Fellowships

The Interdisciplinary Applied Mathematics Program (IAMP) is a one-year program initiated by the Applied Mathematics Group (AMG) at the UMKC Department of Mathematics and Statistics for the year 2016.

The mission of this program is to promote research and education in the field of Applied Mathematics at UMKC. The students will gain experiences employing mathematical techniques to solve real-world problems.

The focus areas are mathematical modeling and analysis of infectious diseases, evolution of populations with climate change, image processing, and chaotic dynamical systems.

Below are brief autobiographies of the recipients of the Interdisciplinary Applied Mathematics Scholarships and Fellowships.

Peter Uhl was born in Kansas City, Missouri and attended Shawnee Mission East high school where he wrestled and played rugby. Peter attended the University of Kansas for three years before transferring to UMKC. Peter graduated with a degree in Mathematics and Statistics from UMKC in the winter of 2015 and is currently pursuing a Master's degree in Mathematics. Peter also spent the summer of 2015 working with Dr. Naveen Vaidya investigating the effects of morphine on the progression of HIV infections and would like to someday pursue a Ph.D. in mathematics.



Mirza Mohd Shahriar Maswood is a Ph.D. student at UMKC in the Department of Computer Science, Electrical Engineering. His major is Telecommunications and Computer Networking and co-major is Electrical and Computer Engineering. This is the third year of his Ph.D. He has al-

ready finished all the required course work and successfully passed Ph.D. Qualifying Examination. Currently, Mr. Mirza is doing research in the energy optimization of data-center networks under the supervision of Dr. Deep Medhi. One of his papers got recently accepted in ITC28. Before beginning the Ph.D. program, Mirza worked as a lecturer in the Khulna University of Engineering and Technology, Khulna, Bangladesh. He recently won a School of Graduate Studies Research Grant, and a Preparing Future Faculty Award. He is expecting to finish his Ph.D. degree by 2018.



Hannah Brackett was born in 1993 in Fountain Valley, California. She graduated from Liberty North High School in Liberty, Missouri in 2012, and currently resides in Liberty with her fiancé Julian Bohn and 2-year-old daughter Chloe. In 2015, she was the recipient of the Live Your Dream Award which is awarded to mothers seeking a degree in higher education. She is currently set to graduate with her undergraduate degree in December 2016. After graduation she plans to find a career where she can apply her studies. In her free time, she enjoys camping with her family and spending time on the lake with friends and family.



Munsur Rahman received the B.S. degree in Mechanical Engineering from Bangladesh University of Engineering & Technology, Dhaka, Bangladesh in 2009 and an MS degree in Mechanical Engineering from UMKC in 2013. He is currently pursuing a Ph.D. degree in Engineering at UMKC under the supervision of Dr. Antonis Stylianou. His co-discipline is Mathematics. His research interests include joint biomechanics and computational modeling of human upper extremities.

Munsur has received several awards, grant proposals, and fellowships during his Ph.D. study including an outstanding IPhD student award, a School of Graduate Studies research grant, a preparing future faculty



scholar award, and an image-based biomedical modeling fellowship. He also published some journal papers and presented his research in various conference proceedings.

Scott Nickell is a senior computer science student at UMKC, after attending Park Hill South High School in Kansas City. He is currently working as an IT specialist with a local government office and working toward a move into the field of data analytics upon graduation. In his spare time he enjoys trail running and tennis.



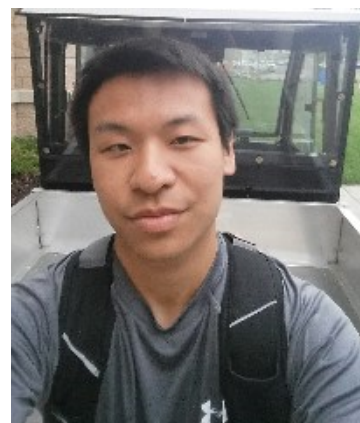
Laura Wymer is a dedicated and energetic self starter with skill sets in biological sciences, research and business development. As a sophomore at UMKC she has academically excelled while working towards her B.S. in Biological Sciences and minor in Entrepreneurship. Laura is currently

honored to be named to the Spring 2016 Dean's List in the School of Biological Sciences. In both May, 2015, and May 2016, she has been the recipient of First Place, Second Place, and Judges' Choice awards by The Regnier Institute for Entrepreneurship and

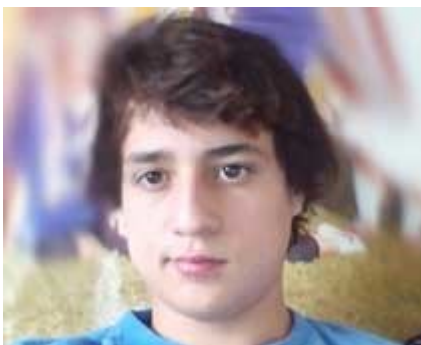


Innovation at the Roo Idea Jump competitions. For her entrepreneurial performance and commitment she has achieved admittance into The Regnier Institute for Entrepreneurship and Innovation's E-Scholars program commencing in January of 2016. Her performance has also gained her the privilege of being one of only 16 students selected state-wide to represent the University of Missouri System in their Entrepreneurial Scholars and Interns Program. Laura's team with the Interdisciplinary Applied Mathematics Program investigates the variables relating to the impact on Missouri agriculture that dramatic freeze events produce. Laura is an active volunteer troop leader with Girl Scouts of N.E. Kansas and N.W. Missouri where she helps build "girls of courage, confidence, and character, who make the world a better place", and is currently applying her growing knowledge of business and biological sciences to a civic engineering committee working with UNI (Urban Neighborhood Initiative) headed by Dianne Cleaver, wife of former Kansas City Mayor, Emanuel Cleaver II. The committee looks to improve Kansas City's under-served neighborhoods by transforming vacant lots into vibrant green-spaces and urban farms.

Christopher Zhao attended Parkway Central High School in St. Louis, MO and was a player on the men's volleyball team that won a state championship in 2014, Chris's senior year of high school. He graduated a National Merit Scholar and is attending UMKC. He is currently a third-year chemistry major who plans to graduate early and attend medical school, which is why he decided to research medical imaging.



Jorgue Martinez was born in 1995 in Joplin, MO. Within the Kansas City community he actively engages at the Boys & Girls clubs as a Group Leader and Swimming coach. Currently Jorgue is involved at Dr. Dobens lab performing immunostaining techniques on *Drosophila* ovaries to uncover the truth behind FOXO expression. At UMKC Jorgue is part of the medical imaging group that is being led by Dr. Li, and is using FSL image segmentation techniques to improve the way MRIs are being interpreted. He is an entering junior Biology B.S. major with a Bio-medical emphasis at UMKC.



Muhammad Sana Ullah received the B.S. degree in Electrical & Electronics Engineering from Chittagong University of Engineering & Technology, Bangladesh in 2008 and an M.S. degree in Electrical & Computer Engineering from Purdue University in 2013. He just finished his Ph.D. degree in Electrical and Computer Engineering at UMKC under Dr. Masud Chowdhury in May 2015.

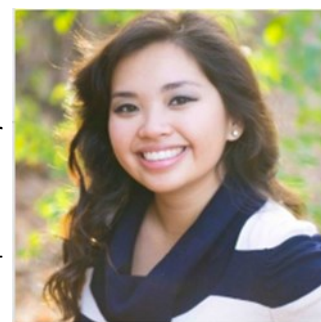
During his master's studies, he was awarded a 'Student Research Grant' and the 'Purdue University Calumet Chapter of Sigma Xi- Student Research Award' from the Graduate School at Purdue Calumet and Sigma Xi—The Scientific Research Society for his outstanding master's research work. Recently he was also awarded an SGS Fellowship and a 'Preparing Future Faculty Scholar Award' from the UMKC School of Graduate Studies and 'Best PhD Student Award' from the Computer Science and Electrical Engineering Department at UMKC.



His research interests include monolayer and multilayer molybdenum disulfide (MoS_2) based Nanoelectronic Devices, BTBT Tunneling, High Performance issue of VLSI Circuits, and VLSI Interconnect Signal Processing. His research focus also

includes Speech Signal Processing, Higher Order Statistics and Spectra in Signal Processing.

LeAnna L. Cates is in her fourth year at the UMKC completing a Bachelor's of Science in Biology with an emphasis in Bioinformatics and a minor in Mathematics. She is currently ranked in the top 5% of her class. LeAnna is completing her senior thesis in microbial community composition in time and space at Boston University under the direct supervision of Dr. Colin Averill and Dr. Jenny Talbot. In addition, she also has interests in mathematical modeling and is working with Dr. Naveen Vaidya to develop a Within-Host model of the Zika Virus. She is also researching Synaptonemal complex structure and function in the Hawley Lab at the Stowers Institute for Medical Research. Outside of her research, Miss Cates was the volume 10 Editor-in-Chief of *Lucerna*, the undergraduate research journal on campus and the Academic Assistant for the Honors College. Her professional goals include attending graduate school in the fields of evolutionary biology and genomics and becoming a professor.



In addition to the abovementioned individuals **Ronald Morris** (Mathematics major) and **Fatima Shariff** (Biology Major) are the recipients of the Interdisciplinary Applied Mathematics Scholarships and Fellowships. The UMKC Department of mathematics and Statistics wishes them best of success in their studies and career paths.

Big Congratulations to the recipients of the Mathematics and Statistics Fellowship

The goal of Mathematics and Statistics Fellowship (MSF) is to encourage and provide assistance to graduate students at UMKC to work on Mathematics or Statistics related research. The 2016 MSF recipients are as follows.

Shimin Tang is a Ph.D. student in the Department of Electrical and Computing Engineering, with co-discipline Mathematics, at UMKC. Shimin is doing research in the area of Anisotropic Mesh Adaptation for Hyperspectral Images under the supervision of Dr. Xianping Li. Meanwhile, she is also working on Hyperspectral Image Segmentation via Deep Learning under supervision of Dr. Zheqiang Chen. She graduated from the Electrical and Electronic school of the University of Manchester, where she earned her Msc. in Digital Signal Processing focusing on the denoising algorithm of Hyperspectral images.



Russell Latterman is an I.Ph.D. student with the Department of Mathematics and Statistics at UMKC, with co-discipline in the Department of Biomedical and Health Informatics of the UMKC School of Medicine. He received his M.S. in Statistics from Northern Arizona University and his B.S. in Mathematics from Arizona State University.



Russell has been teaching for five years, including two years as a GTA at UMKC. Topics include Statistics and Biostatistics, Calculus, and Mathematical Modeling with Microsoft Excel for MBA students. As an undergraduate he worked in summer research programs at Cornell, Rice, NC State, and the Mathematical and Theoretical Biology Institute then held in Los Alamos. He later served as a counselor of the Joaquin Bustoz Math-Science Honors Program for high school students from under-represented socioeconomic backgrounds at Arizona State University. He has co-authored work in Stochastic Cell Biology published through the Journal of Theoretical Biology, supervised by Dr. Sharon Lubkin of North Carolina State University. This was recently cited in June of 2016 in a paper published in PLOS Computational Biology. He has also contributed to cited

work in Mathematical Biology and Epidemiology through the Mathematical and Theoretical Biology Institute directed by Dr. Carlos Castillo-Chavez. He is currently preparing to begin work involving applied statistics and computational mathematics for biological and health sciences, and is also developing a side project involving near-ultraviolet lasers. Russell is a lifetime member of the Society for the Advancement of Chicanos and Native Americans in Science and hopes to one day contribute to the proliferation of active learning and research programs for undergraduate students from under represented socioeconomic backgrounds. He believes we can better accomplish this by increasing interdisciplinary work not only within our individual universities, but also through distance-collaboration and partnership between research institutions nationally and globally. He endeavors to significantly contribute to the success of the transformation of the scientific community in this way.

Jones Mutua is a Ph.D. student in the UMKC Department of Mathematics and Statistics. He was born in 1987 in Machakos in the Eastern Province of Kenya, and graduated with a B.S. degree in Mathematics and Computer Science from the University of Eastern Africa-Baraton (UEAB) in Eldoret Kenya. While attending UEAB, Jones was recognized on the Dean's list for 7 semesters and



was awarded an Honor Roll academic achievement award for the academic year 2011/2012.

In August 2012, Jones was awarded a teaching assistantship to join the UMKC Department of Mathematics and Statistics to pursue an M.S. degree in Mathematics and Statistics which he received in May 2014. Jones started his I.Ph.D. program the following summer semester. Jones' co-discipline is Physics. Jones is one of the pioneers of the Mathematics and Statistics Graduate Student Organization and has served as the secretary of the organization since its beginnings in 2014.

For the past 3 years, Jones has been doing research in the area of applied mathematics, specifically on mathematical biology and mathematical modeling under the supervision of Dr. Naveen Vaidya. In 2015 he published his recent work in the Journal of Mathematical Bioscience and co-authored another piece of work published in the American Journal of Health Research. Jones has also presented his work in a number of conferences and meetings including UMKC Community of Scholars symposiums, AMS sectional meetings, and in the ICMA-V conference in London Canada. Currently Jones is working on multiple projects related to modeling of HIV/SIV infections and drugs of abuse.

Keep Calm and Join Math Club, MSGSO and Chess club: <http://cas.umkc.edu/mathematics/student-organizations.asp>

UMKC Students participate in the 2016 Integration Bee

For this year, most of Mr. Baygents' Calculus II students participated in the Integration Bee contest, which is an annual integral calculus competition pioneered in 1981 by the Massachusetts Institute of Technology. The top three contestants of the 2016 UMKC Integration Bee are:

1. Turhan Hancerli (29 points)
2. Tyler Evans (24 points)
3. Ali Al-Qassabi (18 points)

Congratulations to all three of them and special thanks to Mr. Gerry Baygents for hosting this event. Below is a picture of the participants with Baygents being the first from the right.



Why Study Mathematics and Statistics at UMKC?

Visit <http://cas.umkc.edu/mathematics/why-major.asp> to find the answer

Celebrating the Birthday of Henri Poincaré

Jules Henri Poincaré (29 April 1854 – 17 July 1912) was undoubtedly one of the greatest mathematicians of all time. The Department of Mathematics and Statistics celebrated Henri's 162nd Birthday. Below are photos of Poincaré and the birthday cake for his party at UMKC. Here are two of his famous quotes: "Science is built up of facts, as a house is built of stones; but an accumulation of facts is no more a science than a heap of stones is a house." "To doubt everything, or, to believe everything, are two equally convenient solutions; both dispense with the necessity of reflection."



Lunch Gathering at Bo-Lings on the Country Club Plaza

The faculty members and the administrative assistant of the Department of Mathematics and Statistics had a lunch gathering Sept. 24, 2015 at the country club plaza wishing good luck to Dr. Yong Zeng in his new two year NSF position. The picture below from left to right shows Drs. Li, Rhee, Vaidya, Kalahurka, Bani-Yaghoub, Delaware, Voulov, Segal, the administrative assistant, Ms. Henderson, Mr. Wilson and Dr. Zeng.



Invited Research Talks, Simons Collaborative Math Research and Supervising PhD Student

In the past year, Liana Segal gave three invited research talks in conferences organized by the American Mathematical Society, including the annual Joint Mathematics Meetings in Seattle. She is continuing an active collaborative research program, supported by a 5 year Simons Collaborations for Mathematicians grant. Liana was also a plenary speaker and a career panelist in the 14th Emmy Noether High School Day at Texas Tech University held in May 2016 in Lubbock, TX.



Melissa Menning earned her doctoral degree in Mathematics with co-discipline in Curriculum and Instruction in Spring 2016, under the supervision of Dr. Liana Segal. Her thesis, "Cohomology of modules over short Gorenstein rings", has already given rise to a joint paper with Dr. Segal, accepted for publication in the Journal of Commutative Algebra.

Grants from SMB and CDC, Invited Talks

Dr. Naveen K. Vaidya was awarded a World Outreach Grant of \$4,780 from the Society for Mathematical Biology used to support students, postdocs, and junior faculty from Nepal, India, Sri Lanka, and Indonesia to participate in the Mathematical Biology Workshop in Kathmandu, Nepal (May 26, 2016). Dr. Vaidya also received Euro 1,000 from Commissions for Developing Countries used to support student participants of the International Conference on Application of Mathematics to Non-linear Sciences also in Kathmandu, Nepal (May 26-29, 2016). Earlier he was invited to deliver a colloquium lecture in the Department of Mathematics and Statistics, Oakland University, Rochester, MI on Nov. 24, 2015, as well as talks in the 5th International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems (October 2 - 4, 2015, London, Canada), and the 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications (July 1 - 5, 2016, Orlando, FL).

Mathematical Biology Workshop and AMNS Conference in Nepal

Our faculty member Dr. Naveen K. Vaidya successfully organized a Mathematical Biology Workshop (MBW) in Kathmandu, Nepal on May 26, 2016 during the International Conference of Applications of Mathematics to Nonlinear Sciences (AMNS-2016).



Dr. Vaidya was also one of the members of the organizing committee of AMNS-2016 conference. The conference drew more than 200 participants from 17 countries around the world. MBW was the first workshop of mathematical biology in the history of Nepal. The primary objective of the workshop was to provide an opportunity for mathematicians and biologists in Nepal and neighboring countries to explore mathematical skills that can be applied to address issues of real-life biological systems

The workshop began with an overview of MBW by the moderator and organizer Dr. Vaidya. The first session of the workshop – *Current Situations in Nepal* – contained three talks, by Dr. Sanjay N. Khanal (Kathmandu University, Nepal), Dr. Bishnu Paudel (Bir Hospital, Kathmandu, Nepal),



Drs. Smith, Ciupe, and Schwartz

and Dr. Bijay Bajracharya (Vector Borne Disease Research and Training Center, Nepal).

In the second session "Mathematical Biology Research in Nepal", Dr. Dil B. Gurung (Kathmandu University, Nepal) summarized the current status and growth of mathematical biology research in Nepal. The third session – *Overview of Advances of Mathematical Biology Research and Education* – included three lectures by Dr. Robert Smith? (University of Ottawa, Canada), Dr. Stanca Ciupe (Virginia Tech, USA), and Dr. Elissa Schwartz (Washington State University, USA).



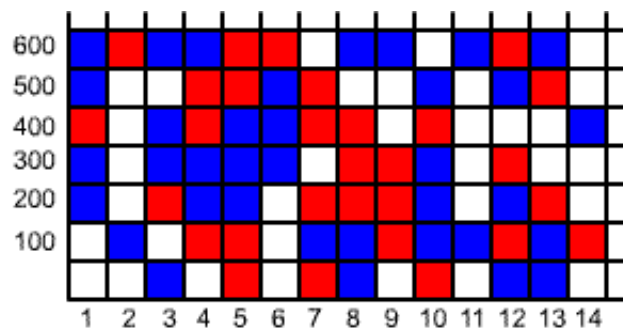
Drs. Bajracharya, Gurung, Khanal, and Paudel

The next session was a panel discussion on "Connecting Mathematical Biology to Nepal and Developing Countries", followed by a question-answer period. The panelists were Dr. Lindi Wahl (Western University, Canada), Dr. Ying-Hen Hsieh (China Medical University, Taiwan), Dr. Narendra Dixit (Indian Institute of Science, Bangalore, India), and Dr. Jane Heffernan (York University, Canada).

The longest proof ever

Source: Math In the Media, American Mathematical Society <http://www.ams.org/news/math-in-the-media/math-in-the-media>

Evelyn Lamb has a news report in *Nature* (May 26, 2016): "[Two-hundred-terabyte maths proof is largest ever](#)," with the subtitle: "A computer cracks the Boolean Pythagorean triples problem--but is it really maths?" As Lamb explains, "The problem asks whether it is possible to colour each positive integer either red or blue, so that no trio of integers a , b and c that satisfy Pythagoras' famous equation $a^2+b^2=c^2$ are all the same colour. For example, for the Pythagorean triple 3, 4 and 5, if 3 and 5 were coloured blue, 4 would have to be red." The answer is no, and the proof by Marijn Heule, Oliver Kullmann and Victor W. Marek, submitted to [arXiv](#) on May 3, 2016, shows that even though such a coloring is possible for all integers up to 7,824 it cannot be extended to 7,825.



The lower left-hand corner of the $100 \times 79100 \times 79$ array of squares illustrating a non-pythagorean coloring of the first 7824 integers. A white square can be either red or blue. Notice that 3 is blue and 5 is red, so the pythagorean triple (3,4,5) is not uniformly colored. Similarly for (5, 12, 13), since 12 and 13 are blue. The triples (105, 608, 617) and (207, 224, 305) can also be checked in this corner. Here is the [entire array](#), due to Marijn Heule and reproduced from *Nature* 534 17-18 with permission.

The proof involved checking each of the approximately 102300102300 ways of coloring the first 7,825 integers, to see that there is always at least one uniformly colored Pythagorean triple. "The researchers took advantage of symmetries and several techniques from number theory to reduce the total number of possibilities that the computer had to check to just under 1 trillion. It took the team about 2 days running 800 processors in parallel on the University of Texas's Stampede supercomputer to zip through all the possibilities. The researchers then verified the proof using another computer program." As for whether it's math or not: "If mathematicians' work is understood to be a quest to increase human understanding of mathematics, rather than to accumulate an ever-larger collection of facts, a solution that rests on theory seems superior to a computer ticking off possibilities." Lamb contrasts the situation here with the status of the previous longest-proof record-holder: a "13-gigabyte proof from 2014, which solved a special case of a question called the Erdős discrepancy problem. A year later, mathematician Terence Tao of the University of California, Los Angeles, solved the general problem the old-fashioned way -- a much more satisfying resolution."

Do you know about the Math and Stat Fast Track programs?

<http://cas.umkc.edu/mathematics/sft.asp>

<http://cas.umkc.edu/mathematics/mft.asp>

Recent or Upcoming Events

Colloquium Talk on Image Processing

Friday, September 23, 2016

Time: 1:00-2:00 PM

Location: Miller Nichols Library, Room 451

Prof. Anne Gelb Professor is an excellent researcher at the School of Mathematical and Statistical Sciences, Arizona State University. The UMKC [Applied Mathematics Group](#) has invited Prof. Gleb to present her recent work on image processing. For more information visit <https://math.la.asu.edu/~ag/> This event is open to the public.



Kansas City Mathematics Technology EXPO

Friday and Saturday, October 7 and 8, 2016

Starting Time: 8:00 AM each day

Location: Royall Hall and Haag Hall

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. Dr. Delaware is the EXPO Group site coordinator. For more information visit <http://www.kcmathtechexpo.org/>

Colloquium Talk on Mathematical Biology

Friday, October 7, 2016

Time: 1:00-2:00 PM

Location: Miller Nichols Library, Room 451

Prof. H. T. Banks is a Distinguished Professor of Mathematics at NC State University. Prof. Banks has published over 400 papers in applied mathe-



matics and engineering journals, has graduated 35 Ph.D. students, has directed more than 36 post-docs, has written four books, and edited several others. The UMKC [Applied Mathematics Group](#) has invited Prof. Banks to present his recent work on Mathematical Biology. This event is open to the public.

Mathematics & Statistics Research Day

Friday, April 14, 2017

Time: 10:00 am-3:00 pm

Location: Royall Hall Rm. 305

The UMKC Mathematics and Statistics Research Day is an annual event celebrating student and faculty research, creative, and scholarly activities. This event is open to public and it promotes research in mathematics, statistics, and the applications in various fields. The deadline for registration is 5:00 p.m. Tuesday, April 5, 2017.

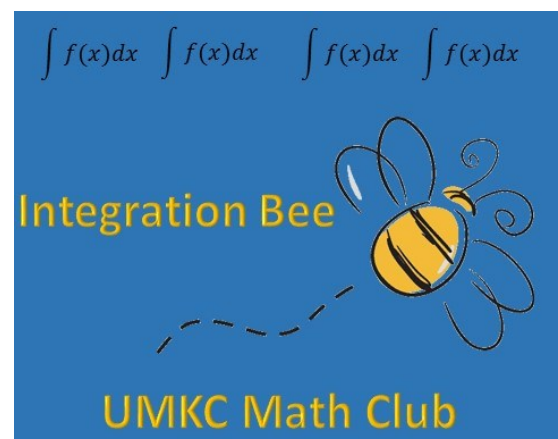
Integration Bee

Thursday, April 20, 2017

Time: 12:00-1:00 PM

Location: Royall Hall Rm. 402

The Integration Bee is a contest for undergraduates and high school students with prizes for the best skills in evaluating indefinite integrals. This event is hosted by [the UMKC Math Club](#). Everyone is welcome. Whether you are a participant or an audience member there will be plenty of snacks and drinks for everyone.



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.

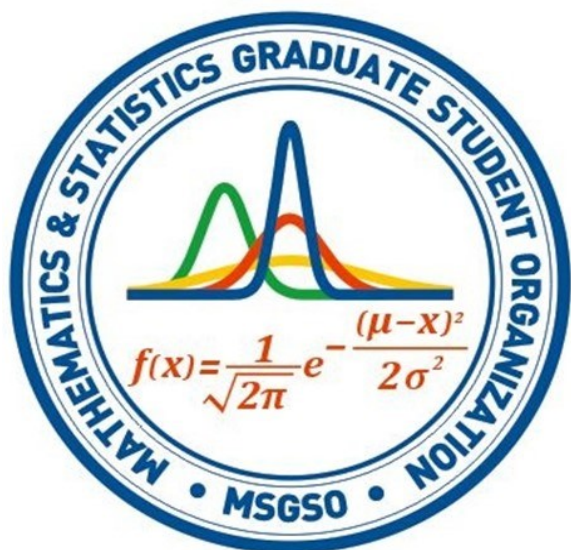
Find out Chess Club meetings and activities at: <https://roogroups.collegiatelink.net/organization/ucc/documentlibrary>



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 304 F

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.

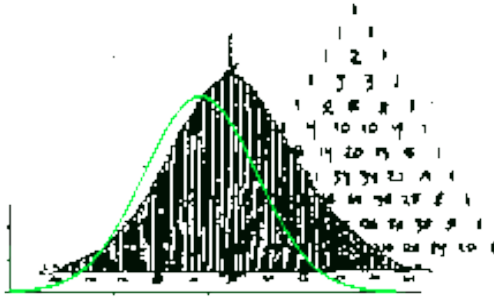
Location: Manheim Hall Room 304 F

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

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 Newsletter published in Aug., 2016

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



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

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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IPhD Coordinator: Dr. Noah Rhee
Undergraduate Advisor: Dr. Majid Bani-Yaghoub
College Algebra Coordinator: Dr. Bill Kalahurka
Calculus Coordinator: Dr. Liana Segal
Seminar Organizer: Dr. Xianping Li
Administrative Assistant: Tanya Henderson hendersontg@umkc.edu

Math Puzzler

"Thirteen teachers are in Paradox, New York attending a math conference. When they arrive at the Enigma Hotel to check in, they are told that only 12 rooms are available. Since their school had made reservations for 13 rooms, the teachers are a bit upset that they will have to find another place to stay. As they are preparing to leave and find another hotel, the manager comes out and asks if there is a problem. When she hears of their situation she assures them that the Enigma Hotel has enough space to accommodate each teacher in his or her own room. She takes two of the teachers to room #1 and promises to come back in a few minutes and take one of them to another room. She takes the third teacher to room #2, the fourth teacher to room #3, the fifth teacher to room #4 and so on, taking the twelfth teacher to room #11. She then returns to room #1 and escorts the extra teacher waiting there to room #12. All of the teachers are now happily settled in their own rooms. Is this possible?"
 Source: AIMS Education Foundation