

ACME

A new wave of excitement hit the BYU Department of Mathematics in the fall of 2013. Posters proclaiming, "Make Your Mark" covered the walls of the Talmage Building, highlighting the contributions of famous mathematicians and encouraging students to see where a degree in math can take them. Another campaign focused on finding out how different kinds of technology work, such as Google, Siri, and GPS. These marketing efforts introduced "ACME," the Applied and Computational Mathematics Emphasis.

ACME is not your average math program. The program integrates mathematics, statistics, and scientific computing, to give students the skills they need to solve important, cutting-edge, real-world problems. Students register for their first year of classes in the emphasis, or the "junior core," after completing a year of prerequisite classes. Because solutions to modern day mathematical problems come in the form of algorithms, the first year of ACME involves the design and analysis of algorithms. Students learn how to program algorithms on the computer and solve a wide array of problems stemming from multiple disciplines. Senior ACME students learn about mathematical modeling, the process of taking a real world problem and abstracting it to a math problem, finding the solution by using an algorithm, then taking that solution back to the real world to see if it is viable. In addition to the core ACME classes, students take courses corresponding to a specific concentration.

Currently, there are 28 concentrations for students to choose from, ranging from biology to economics to electromagnetics.

The first ACME cohort entered the program in September 2013. Dr. Jeff Humpherys, one of ACME's founding professors, said, "The students had to work really hard to get acclimated to the intensity of the program; they are working at a higher level than they do in many other classes." Professors were amazed at how quickly the cohort of students forged tightly knit friendships, making for a cohesive classroom environment. "They responded to the high pressure environment by learning how to work together and use one another's strengths to come up with solutions to the problems they are working on," says Dr. Humpherys of the students. Remi Fuhriman is a part of the first cohort of ACME students. After her sophomore year at BYU, Fuhriman went to Europe for an art history study abroad and promised herself that by the time she got back, she would have chosen between majoring in math or electrical engineering. She came back without an answer. "I met Jeff (Dr. Humpherys) a few days after I got back to Provo and by the end of the semester, I was sold on doing ACME. It took exactly what I wanted from both of these programs: versatility, application, and demand," recounts Fuhriman.



Humpherys and Jarvis will be working hard this summer to polish and improve the textbook and labs for next semester's students.

"ACME sets up students to make a difference in whatever field is of interest to them," states Jared Whitehead, who begins a tenure-track position this fall in the Math Department. With its many concentrations and multidisciplinary foundation, ACME provides students with a wide range of job opportunities and internships. In fact, the ACME program gives students a chance to pursue an internship during their senior year. Dr. Jarvis adds, "Students can go on to pursue graduate degrees in a variety of subjects with an ACME undergraduate. The program helps them get the math tools they need for many other disciplines."

The Math Department wishes its congratulations to the professors and students who took part in ACME's successful inaugural year. The program's future is promising as it continues to provide students with the cutting-edge experience they need to thrive in an increasingly mathematical world.

*Dr. Humpherys, ACME presentation at
BYU President's Leadership Council:
<http://youtu.be/Uz1SsBA5pxM>*

acme@math.byu.edu

**"ACME takes the rigor of pure mathematics and applies it to real-world problems."
—Remi Fuhriman**

Though scared of being a part of the first cohort to ever experience the program, Fuhriman has found success alongside the 17 other students in the cohort. She agrees with Dr. Humpherys' sentiment that the students are great friends and added there is a great atmosphere of respect and support in the cohort. "I can't even express how great Jeff and Dr. Jarvis are," Remi notes, "They work so hard and have great advice and wisdom to offer." Next year, Fuhriman plans to pursue an internship, graduate from BYU, and find a job involving big data, possibly in the health care field.

ACME evolved from IMPACT, the Interdisciplinary Mentoring Program in Analysis, Computation, and Theory, which began about seven years ago. This research group trained students in the summer and then placed them in interdisciplinary research groups in the fall. Students and professors joined together every week to discuss their research experiences. It was very successful in placing students in top PhD programs and companies throughout the country. Dr. Humpherys attributes ACME's existence and success to the seven years spent developing and perfecting IMPACT. The program's designers gained an understanding of which other disciplines are using mathematics to solve problems and consolidating ideas from these disciplines into ACME's common core of mathematics, statistics, and computation.

Dr. Jarvis, another founding ACME professor and the former department chair, looks forward to the program's second year. Twenty eight students will be a part of ACME's second cohort, which will begin the junior core classes in the fall of 2014. Drs.



Our graduate program was recently ranked 73rd in the nation by U.S. News and World Report. This is the fifth best ranking of any graduate program at BYU, after two graduate programs from the Marriott School of Management, after the Law School, and after Audiology and Speech-Language Pathology. This is an excellent result and is a reflection of the quality of research being done by both our faculty and graduate students.

We continue to excel in involving our undergraduate students in high-quality research. During 2013, 26 professors mentored 80 undergraduates in their research. Twelve students gave presentations at national research conferences and five papers authored by undergraduate students were published. In the recent Spring Research Conference, 52 mathematics students gave presentations on their research. Quality seems to be advancing! We have ambitious goals. We need to increase funding for both scholarships for our talented undergraduate students and to allow our students to travel to professional conferences. Another goal is to improve the opportunities for high-quality internships and post-degree employment for our students. If you are in a position to help, please contact Lisa Winegar at 801 422 5925 or lisa.winegar@math.byu.edu.

Many thanks for your continued interest in BYU Mathematics! We are advancing as fast as we can and believe that we are moving in the directions required by the exciting, evolving world in which we live.

Robert Roundy

For the second year in a row, BYU is a top-10 finisher in the William Lowell Putnam Mathematical Competition. We finished ninth this year and seventh last year. It is very sweet to defeat Princeton, Yale, UCLA, etc. This elite competition attracts over 4,000 of the very best students who are enrolled at over 500 universities. These victories will strengthen our growing reputation as a school that produces top-quality students in mathematics. Many congratulations to our team members: Sam Dittmer, Peter Baratta, and Robert Yang! The Applied and Computational Mathematics Emphasis is doing very well. On a personal level, this spring I will start teaching the ACME course on probability and stochastic processes and that will be a lot of fun! The first cohort of students is learning a tremendous amount and they are very excited about their education. The National Science Foundation recently recognized the importance and degree of innovation in this program by awarding the \$600,000 TUES grant to BYU Professors Humpherys and Jarvis to help fund the creation of ACME. ACME is just one of four recent indicators that we are quickly becoming a national leader in undergraduate education in mathematics. A year ago, BYU Professors Dorff and Jarvis received the \$1,280,000 CURM grant from the National Science Foundation, designed to teach Mathematics professors nationwide how to mentor undergraduate students in research. More recently, Dr. Dorff and a few others were awarded the \$2 million PIC Math grant, designed to connect Mathematics undergraduates nationwide with internship opportunities. Finally, an NSF-funded study executed by the MAA recently singled out BYU's Calculus 1 course as one of five courses nationwide from which others can learn.

DR. ROUNDY LETTER FROM THE DEPARTMENT CHAIR



Good news continues to reach the BYU Math Department! We are very excited about many things that have happened in the last six months!



PUTNAM

"It's exciting for BYU to place in the top ten two years in a row and it's also exciting for me to do so well in my last year here. Competing on BYU's Putnam team has been a lot of fun, and I will miss it." –Sam Dittmer

They have done it again! The BYU Putnam Competition Team placed ninth overall in the 74th William Lowell Putnam Mathematical Competition, held on December 7, 2013. The team, which included Peter Baratta, Sam Dittmer, and Tianyi Yang, was recognized with an honorable mention by the William Lowell Putnam Mathematical Competition. Baratta and Dittmer were both members of last year's competition team which placed seventh overall. Sam Dittmer earned an honorable mention (awarded to individual ranks 26-76.5) and Peter Baratta and Yifeng Xu (not a team member) earned individual scores qualifying them for ranks 110-201. Dittmer said, "It's exciting for BYU to place in the top ten two years in a row, and it's also exciting for me to do so well in my last year here." The team was coached by Dr. Tiancheng Ouyang. A total of 4,113 students from 557 colleges and universities in the United States and Canada participated in this year's competition. Competing teams came from 430 educational institutions.

PI DAY The BYU student body enjoyed another great Pi Day on March 14 in Brigham Square. The sun was shining as students participated in activities such as the "Pi Eating Contest" and "Pi the Professor." With over 44 pies eaten in the "Pi Eating Contest" and nine professors and graduate students pied in the face, pi(e) was definitely prevalent at this year's Pi Day. Other favorite Pi activities included Buffon's Needle, Pi Frisbee, Pi Hoops, Pi Puzzlers and Plinko. Over 50 volunteers joined the Math Department staff in running the booths.

Clark Anderson, a senior in Mathematics, recited a record-breaking 2,448 digits of pi in this year's Pi Recitation. Anderson held the department's record from last year with 988 digits of pi recited. A large crowd gathered to watch his recitation, which took over 30 minutes.

At 1:59:26, the Pi Countdown began. The horns, noisemakers, and candy celebrated the end of another fun and successful Pi Day.

This year's Pi Day t-shirt was a hit amongst the students and the public. Free Pi Day t-shirts were given to several people in the crowd with a Pi Birthday. Several contest winners also received a free t-shirt. For the first time, the Math Department sold baby onesies and toddler t-shirts. All department apparel is still available to purchase at math.byu.edu. They may also be purchased at the Math Department Office in room 275 TMCB.

Kalli Renda, the Math Department Events Coordinator, took on the challenge of planning and overseeing the Pi Day activity. "Pi Day provides the opportunity for mathematicians and non-mathematicians to celebrate their love for pi. The event unites the student body and is always a lot of fun," says Renda. Preparation for the 2014 Pi Day event began in March 2013, and plans for next year's celebration are already underway.

Mark your calendars for next year's once-in-a-lifetime Pi Day of 3-14-15! Several smaller events, in addition, to the central celebration at Brigham Square will take place to commemorate the occasion!

CALCULUS THE MUSICAL More than 600 people attended the performance of "Calculus: The Musical!," held in the Joseph Smith Building Auditorium on Friday, March 28. Rachel Newman and Alie Litras, of Cincinnati's Know Theatre, portrayed Issac Newton's (and others') development of calculus through musical parodies of The Beatles, the 'Can-Can,' and even Eminem. The audience, which included groups from local high schools and travelers from as far away as Idaho, enjoyed the energetic performance, especially for its humor.

The show's history dates back to 2006, when math teacher Marc Gutman and actress Sadie Bowman came together to form Matheatre. They co-wrote the musical with the idea of bringing math, music, and comedy together. In their show, The Who's "The Kids Are Alright" becomes "The Limit's Alright" and Red Hot Chili Peppers' "Under the Bridge" becomes "Under the Curve." Starting in 2008, Know Theatre began touring the show nationwide. During the school year, they routinely perform the musical a dozen or more times in a month.

While students may be accustomed to hearing groan-inducing math jokes from teachers, such was not the case with "Calculus: The Musical!" Rarely has a review of calculus evoked as many smiles, laughs, and cheers as were seen throughout the show. By the end, all could say, in the words of the finale itself, "I have calculus in the heart."



Ann Cox | Alumni

Dr. Ann Cox is a Program Manager in the Cyber Security Division of the Homeland Security Advanced Research Projects Agency. She manages Internet Measurement and Attack Modeling, which focuses on national security threats in cyberspace. Dr. Cox earned a BS in Mathematics from BYU, an MS degree in Mathematics from Idaho State University, an MS in Computer Science from James Madison University, and a Ph.D. in Mathematics from Auburn University. Dr. Cox has been a teacher, business owner and worked in the Office of Weapons and Space at the National Security Agency. Dr. Cox is the mother of six and grandmother of eleven.



Bob Wood | Alumni

Bob Wood graduated from BYU with a BS in Mathematics in 1991 and an MS in Applied Math in 1993. After studying economics at the University of Rochester and Stanford University, he worked as a risk portfolio analyst. He returned to Utah as Director of Marketing Strategy and Communications at Verticore. In 2005, he started as Director of Marketing for Wing Enterprises and entered the Executive MBA program at BYU. He then became Director of Marketing Science at Cox Communications. He completed an MS at Wichita State (statistics emphasis) and started a PhD in Psychology. He is a doctoral candidate working on his dissertation in the modeling of consumer choice. He is currently the Senior Director for Merkle. Mr. Wood and his family live in Elliott City, Maryland.



Emily Evans | Tenure Track

Dr. Emily Evans, currently a visiting faculty member, will begin a tenure-track position with the BYU Department of Mathematics in Fall 2014. She earned a BS in Economics from the University of Utah and a PhD in Mathematics from Worcester Polytechnic Institute. Dr. Evans worked as a software engineer for 8 years before going back to get her PhD. She came to BYU in August 2011 for a post-doctoral position and stayed here because of the great research collaborations she has been a part of with her colleagues in the Math Department. Her research interests include mathematical biology, isogeometric analysis, numerical methods, and fractals. Dr. Evans and her husband David are parents to one daughter, Eleanor.



Ben Webb | Tenure Track

Dr. Benjamin Webb begins his tenure-track position in August 2014. As an undergraduate at BYU, he obtained a BS in Mathematics and a BA in German. He then earned an MS in Mathematics from BYU and a PhD in Mathematics from Georgia Institute of Technology. Dr. Webb was a visiting assistant professor for the BYU Department of Mathematics prior to accepting a postdoctoral position in the Laboratory of Statistical Physics at Rockefeller University. Dr. Webb focuses his studies on dynamical systems and their applications. He and his wife, Rebekah, have five children.



AWARDS & ACHIEVEMENTS

TODD FISHER DISTINGUISHED CITIZENSHIP

Dr. Fisher has performed admirably on the hiring committee. His contributions as head of the hiring committee, at a time when the Math Department is filling a large number of faculty slots, have distinguished him as an essential contributor to the smooth functioning of the department.

TYLER JARVIS DISTINGUISHED MENTORING

During 2013, Dr. Jarvis worked with an unusually large research group containing students at all levels, from undergraduates to doctoral students. He provided them with a high quality environment in which they learned to do groundbreaking research.

JEFF HUMPHERYS DISTINGUISHED RESEARCH

Dr. Humpherys publishes regularly in top research journals. His publications, combined with his impressive records of receiving external funding to support his research, distinguish him as one of the department's top researchers.

WAYNE BARRETT DISTINGUISHED TEACHING

Throughout his career, Dr. Barrett has demonstrated a great interest in helping students to learn mathematics. His students comment that he is an effective teacher who shows concern for his students and provides a great learning environment.

BYU PUTNAM TEAM PLACES NINTH OVERALL

The BYU Putnam Team ranked ninth in the nation in the December 2013 competition. Dr. Tiancheng Ouyang guided Peter Baratta, Sam Dittmer, and Tianyi Yang to BYU's second top-10 finish in two years.

BYU GRADUATE PROGRAM RANKED 73RD

U.S. News and World Report ranked the BYU Math Graduate Program 73rd in the nation in 2014. The BYU Math Graduate Program is the fifth-highest-rated graduate program at BYU. The report also ranked BYU 62nd in National Universities, 52nd in High School Counselor Rankings, and 10th in Best Value Schools.

MAJOR FIELD TEST

BYU Mathematics students' scores on the Major Field Test placed BYU in the top five percent of all institutions in the U.S. The nationwide average is 31 percent correct, whereas the BYU average is 46 percent.