

CAL POLY POMONA Mathematics and Statistics

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INSIDE THIS ISSUE

Message from the Chairs

New Faculty

Student News

Scholarships

In the Community

Message from the Chairs

Arlo Caine and Jenny Switkes
Math/Stats co-chairs for Spring 2021

Welcome back for Spring 2021!

This semester Dr. Berit Givens is on a well-deserved sabbatical. Upon her return, she will continue her outstanding leadership of our department. We wish her a wonderful sabbatical semester!

The department is pleased to welcome our newest tenure-track faculty member, Dr. Manuchehr Aminian. Manuch joined our department in Fall 2020. He recently completed a postdoc at Colorado State University, after receiving his Ph.D. in Mathematics from University of North Carolina, Chapel Hill. His research interests include partial differential equations and machine learning. Many of you will meet Dr. Aminian in MAT 2010/L or in other applied mathematics courses!

Faculty members Dr. Dhanwant Singh Gill, Mr. Ben Miller, and Ms. Sharon Muehlbacher have retired. We wish each of them the very best in their retirement and thank them for their many years of teaching generations of students.

Message from the Chairs

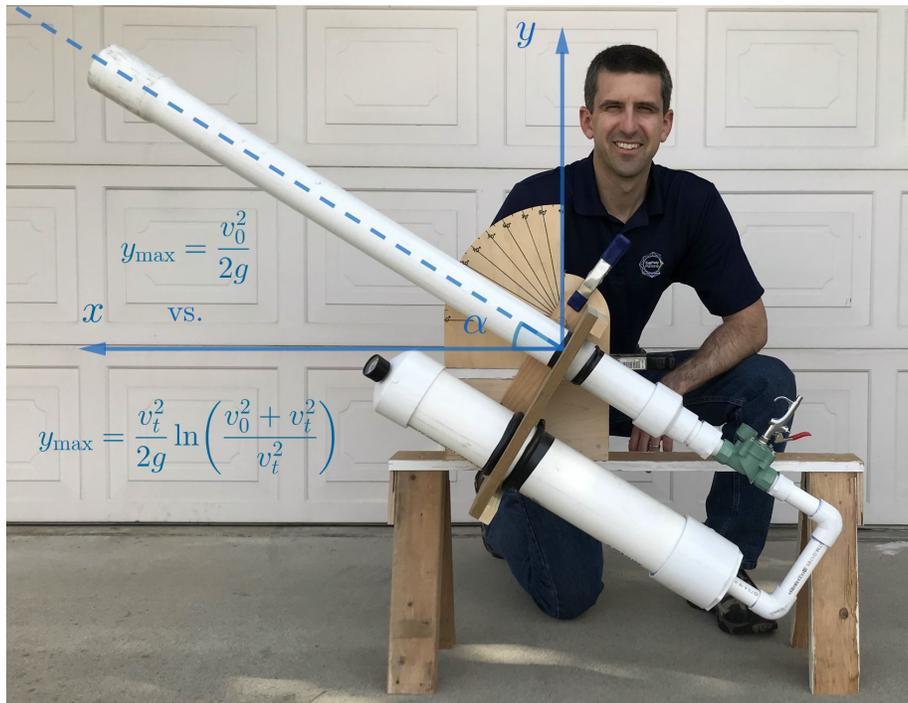
Arlo Caine and Jenny Switkes
Math/Stats co-chairs for Spring 2021

While stuck at home over the break, Dr. Arlo Caine used his tools, some scrap wood, and plumbing supplies to build a compressed-air tennis-ball cannon with his children. 120 psi can launch a tennis-ball at about 65 mph. They've been having fun testing models of projectile motion with and without drag.

Although we are continuing online in spring, we have many opportunities to connect with one another. Join us for our colloquium series. Be part of one of our student clubs. Participate in online mathematical conferences, and more.

These are extraordinary and challenging times. We are here to help. If you have questions or needs, please know that you can always reach out to us at mathstat@cpp.edu. Our staff and student assistant team will get back to you and, if we do not know the answer, we will help you find the answer. Our campus has resources to help with many kinds of challenges, including COVID-19-related resources, basic needs help, mental health support, and more. You are not alone.

We wish you a safe, productive, and enjoyable spring semester as we do mathematics together in (online) community!



Welcome to a new member of our community!

Manuchehr Aminian grew up in Denver and received his B.S. in applied mathematics at the University of Colorado, Denver. He went on to do his PhD in mathematics at UNC Chapel Hill, supervised by Richard McLaughlin and Roberto Camassa, where his thesis was on the analysis of passive tracers, a specific class of partial differential equations. This was done both from a mathematical analysis (“pen and paper”) approach as well as performing numerical simulations. Prior to starting his position at Cal Poly Pomona, he was a postdoctoral fellow at Colorado State University, where from 2017-2020 he was part of two research consortia interested in characterizing and acting on the early stages of infectious disease in individuals. Ideally the end goal would be actionable ways to identify infectious state before a person would show symptoms or develop therapeutics to control the severity of symptoms.

Manuchehr finds a lot of commonalities between Cal Poly Pomona and his own undergraduate experience at CU Denver, which is part of what drew him to this position. His own undergraduate institution is in downtown Denver, and primarily a commuter campus. He didn’t really have university in the mind when he started his undergraduate as an “undecided” major, but was shepherded to mathematics by a few influential professors. If asked for general advice about a mathematics degree, he credits his relationships with a diverse set of math professors then – both formal and informal mentorship, in addition to just taking classes – as a large influence on who he is as a mathematician and person today. He encourages students here to seek these out as well and strives to be such a positive role model for the students here.



His side hobbies include lurking in cafes, exploring and visualizing data sets unrelated to his research, and going on day hikes. On a prior visit to a summer workshop to Claremont, he was tricked in to climbing part of the path up Mount Baldy in dress clothes. He vindicated himself in his first week here in July by trying once more. He forgot to bring water, but still managed to get to the top (copiously drinking from stream by the Sierra Club ski hut).

CMMS, PMA, and BAMM!
John Rock

Center for Minorities in the Mathematical Sciences (CMMS)

<https://minoritymath.org/>

The Center for Minorities in the Mathematical Science (CMMS) is a new community that was created by a small but passionate group of mathematicians united towards creating structures and opportunities for collaborations within the minority mathematical community, among other objectives. At the moment, CMMS is still very new and is open to faculty interested in furthering its goals.

Pacific Math Alliance (PMA)

<https://www.pacificmathalliance.org/>

The main goal of the Pacific Math Alliance is to build a regional community of mentors that will help underserved students to pursue advanced studies or a career in the mathematical sciences. The PMA recently hosted several Zoom webinars that have been posted on the webpage. Students in the mathematical sciences are welcome to become PMA Scholars via nomination by faculty or self-nomination.

Bolstering the Advancement of Masters in Mathematics (BAMM!)

<https://sites.google.com/a/mail.fresnostate.edu/bamm/>

The BAMM! program will be accepting applications for Fall 2021. The deadline will be April 1st, 2021, but the website is not quite up to date. BAMM! provides financial support and mentoring for Master's students who wish to pursue a Ph.D. in the mathematical sciences. BAMM! is a fulfilling, cohort-based program in which participants receive annual scholarships of up to \$10,000 for a maximum of two years at any of the three BAMM! sites. Key features of BAMM! include, but are not limited to, a supportive community of fellow students and mentors, advanced coursework in the mathematical sciences, research experiences, continual guidance, and opportunities to travel to attend conferences in which students can network and gain experience presenting their results. Applicants must have a desire to pursue a Ph.D. in the mathematical sciences, including Pure Mathematics, Applied Mathematics, Statistics, and Mathematics Education, after getting their Master's at one of the BAMM! sites. Low-income students with demonstrated financial need and students from underrepresented groups in the mathematical sciences are particularly encouraged to apply.

Celebrating Our 2020-2021 Scholarship Recipients!

Jillian Cannons, Amber Rosin, and Cristina Runnalls

On October 15th, 2020 the Mathematics and Statistics Department held our annual scholarship reception to honor the awardees of scholarship for the 2020-2021 academic year.

Congratulations to all of our recipients.

John and Rosetrina Flaig Mathematics

Scholarship Recipients:

Noha Abdulhadi

Oladimeji Salako

Stuart Friedman Memorial Scholarship

Recipient:

Theodore De Santos

Samuel Gendelman Memorial Scholarship

Recipients:

Rasha Issa

Eric Golden

Kenneth B. Kriege Mathematics Department

Scholarship Recipient:

Jazzeyla Castillo

Dr. Emil R. Herzog Department Scholarship

Recipients:

Theodore De Santos

Vivian Hernandez

Mr. and Mrs. Keith Soon Kim Mathematics and Science Scholarship Recipients:

Andrew Aguilar

Esteban Escobar

Armando Gallegos Memorial Mathematics

Endowed Scholarship Recipient:

Keshet Weinstein

Applications for the 2021-2022 academic year

The Scholarship Committee is accepting applications for scholarships for the 2021-2022 academic year. Applications, including two recommendation letters, are due **February 19, 2021.**

Please visit the following webpage for more details:

<https://www.cpp.edu/sci/mathematics-statistics/scholarship-opportunities/index.shtml>

The Plague, The Calculus, and Flight

Karen Vaughn

Calculus, called infinitesimal calculus early on, was primarily and independently developed by the Englishman Isaac Newton and the German Gottfried Wilhelm Leibniz.

In its basic form, calculus studies rates of change, instantaneously. Newton developed calculus primarily to solve problems in physics and engineering, the applied side. Leibniz's focus was on notation and concepts, the pure for-the-sheer-joy-of-it side.



Sir Isaac Newton c. 1689

Newton developed much of his version of calculus in 1665-1666, but didn't publish his findings until later. Meanwhile Leibniz' research says that in 1675 he recorded his discoveries. So you can imagine the students and supporters of each brilliant man started a 100 year controversy over who was the real pioneer.

There is so much that Newton did, but these days it is of particular note that he worked on discovering calculus during the Great Plague of 1665-6. To escape the outbreak that ravaged Cambridge, Newton fled to the relatively safe countryside estate of Woolsthorpe Manor, the family home near Grantham, Lincolnshire, England . Newton made two long visits between the summer of 1665 and the spring of 1667.

Isolation and change. These words not only describe our current global situation, but also Newton's. In these extreme circumstances, he was nothing short of amazing. What he produced at this time, can best be said with his own words:

For in those days I was in the prime of my age for invention & minded Mathematics & Philosophy more than any time since.

Along with working on the problems of light (Prisms) and finding that which binds the whole universe together (Universal Magnetism), Newton tackled the fundamental question of rates (Calculus). During his time at Woolsthorpe, he wrote three papers on Fluxions (his calculus) which culminated his most intensive period of mathematical creativity.

Upon his return to Cambridge, Newton was elected a Minor Fellow of Trinity College. Then, two years later, he was appointed the second Lucasian Professor. But there's more to thank him for: aerodynamic principles.

Fast forward to today when students are looking for new ways to improve on the simplest idea of rates, $\text{Rate} = \text{Distance}/\text{Time}$. They must grasp equations like the equation of motion, the continuity equation, and equation of conservation of energy.

These are a system of three equations in vector form that talk about the air (or fluid) flow that allows a solid body (airfoil/wing) to rise.

It all looks daunting, but let me tell you that the equations are riddled with calculus! And without it, there would be no analysis of aerodynamics!



Woolsthorpe Manor

So much was accomplished by Newton and his contemporaries, that upon his death, the scientific community dubbed it Newtonian Mathematics. Moreover, its profound influence on all other branches of our culture created the Age of Reason. Amazing!

I hope that you are encouraged that Newton used his time during the Great Plague to focus intently on solving physics and engineering questions by discovering The Calculus. And I hope that each of us finds a driving force with which to emerge from 2020 with optimism and discovery!

(Reprint from Orange County Ninety-Nines' International Women Pilots Organization Newsletter, PlaneTales, October 2020)

This issue was produced by the 2020-2021 Newsletter Committee:
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Please contact
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