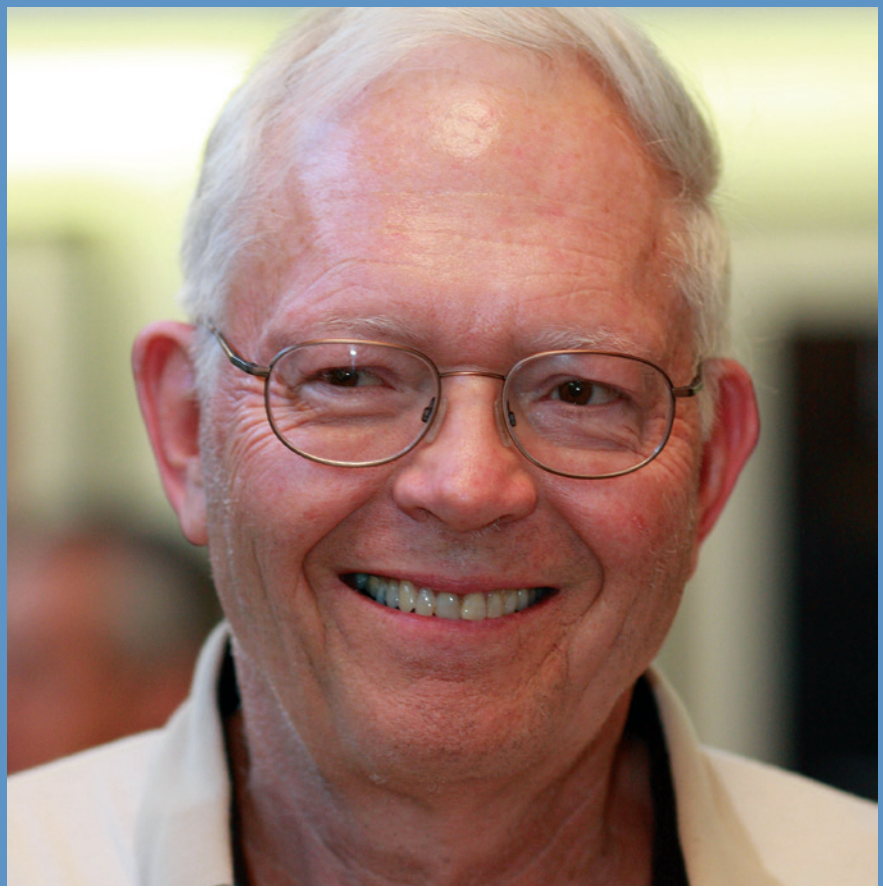
UCLA

We are Mathematics

THOMAS M. LIGGETT

1944 – 2020



Tom's commitment to excellence in teaching and research is storied, but while he is lauded as a brilliant mathematician, he is also remembered by everyone in his orbit as a man with immutable standards of integrity, loyalty, kindness and respect, values that were internalized early in his life. Tom's parents were missionaries, and when he was 2 years old, the family left their Midwest home to serve this calling, first in South America and later in Puerto Rico during his teenage years.

Tom acquired his mother's skill in mathematics — she had an undergraduate degree in the field — completing his bachelor's degree at Oberlin College in 1965 and his doctorate at Stanford University in 1969. As a college student, he was an enthusiastic choralist, singing bass in choirs and glee clubs. At UCLA, he joined a madrigal group, which performed only for themselves. Fellow member and math colleague, Bob Brown, explained that madrigals are not easy: The leader sounds the key note, and the singers must navigate often intricate counterpoints with no support except from each other. A beautiful voice and training are not required because the 14th century folk for whom madrigals were written had neither. This challenging scenario was perfect for Tom.

Christina Goodale entered Tom's life when he arrived at UCLA in 1969 as an assistant professor in mathematics. She met him while working as a graduate administrative assistant in the Department and took his faculty photo. They wed in 1972. Throughout their enduring marriage, they shared a love of music, sports, books and travel with total dedication to each other and family.

Tom's interest in probability began at Oberlin College, however, his initial work at UCLA was in functional analysis. He and Mike Crandall, published impressive results in 1971 on nonlinear semigroups, which became known as the Crandall-Liggett generation theorem.

A paper by Frank Spitzer soon changed the trajectory of Tom's career, and the ensuing research helped to build the foundations of interacting particle systems. Departing from the model-specific work of most researchers, Tom took a general approach to the subject, rooted in what he knew — functional analysis. He became an associate editor of the *Annals of Probability* in 1979, and later its editor.

In a 1972 paper, Tom proved the existence of interacting particle systems. Publication of his lecture notes from a course he taught at the Saint-Flour Probability Summer School in France in 1977 was a milestone, disseminating new and pioneering work to a broad audience of probabilists and creating the basis for his famous monograph, *Interacting Particle Systems*. Published in 1985, the book has been cited 5,000 times and continues to educate students and researchers. One of his colleagues opined, "Many careers derive in part from Tom's foundational work."

Tom became a full professor in 1976 and began assuming administrative duties in the Department, including a term as chair in 1991. Though administration was the least favorite part of his faculty obligations, he was an excellent leader and a strong team member, and as a result of this reputation, his professional service was sought by organizations around the world. These investments in the mathematics community, perhaps modeled by his parents' commitment to service, were significant.

Soon after their marriage, the Liggetts bought a house and started a family — son Tim and daughter Amy. Their summers were enriched with trips to *all* of the national parks in the western United States, and some in Canada, as well as visits to Europe and South America.

While Tom loved both research and teaching, Chris maintains that teaching was his calling from the first years at Oberlin. Unusual for a top-level mathematician, Tom took great care to teach not only graduate level mathematics but also the Department's introductory undergraduate courses. Said one of his students, "I recall absolutely nothing beyond the compelling sense of theater as Tom's mathematics unfolded on the blackboard." Another recalled: "Just like his books and research papers, Tom's teaching was crystal clear." And memorably, "He had such skill with a stick of chalk."

International recognition of Tom's research accomplishments, including academic honors and prestigious invited lectures, were steady throughout his career. For him, the high point was his election to the National Academy of Sciences. Also prized are a Guggenheim Fellowship and an Alfred P. Sloan Research Fellowship. His invited lectures number in the hundreds.

"His recipe was simple: start with the small cases and then generalize. Magically, he appeared to be always successful."

Gratified by the success of his first book, Tom continued to study important examples of interacting particle systems over the next decade, focusing on the voter model, the contact process and the exclusion process. His second book documented these studies and their deep results. About his approach to research, one colleague wrote, "His recipe was simple: start with the small cases and then generalize. Magically, he appeared to be always successful." About his papers, one colleague suggested, "He was writing not only for our contemporary community, but with an eye to the mathematical readers of the future." He was a mentor for many probabilists across two or three generations.

While his major research was in particle systems, Tom also proved key results in several other areas of probability. He was part of a team that proved the longstanding Aldous spectral gap conjecture in the field of mixing times. Though published over a decade ago, one of his several papers on negative dependence is still considered among the most important and relevant in this area. His keen problem-solving ability, sometimes referred to as his *superpower,* is a recurring theme in all of his work. He was above all, an analyst, and would not let a problem go.

In 2011, at the age of 67, Tom retired, but he doggedly continued with his research, writing and speaking until shortly before his death. In 2012, he was elected to the American Academy of Arts and Sciences, another great achievement, and appointed as a UCLA Distinguished Research Professor in Mathematics. The following year, he was named Fellow of the American Mathematical Society. As a couple now, Tom and Chris continued to travel, though less frequently and at a slower pace — often on cruises. Already diagnosed with diabetes, Tom experienced further health problems after a fall in 2018, which left him with serious ailments and debilitating injuries. He contracted pneumonia in early 2019, which led to complications, and finally his death in 2020.

To honor Tom's memory and express gratitude to UCLA and the Department for 50 years of support, fulfillment and joy, Chris made a generous gift on behalf of Tom and herself to reward and acknowledge the hard work of math graduate students and postdocs.

In a memorial tribute, one of Tom's more difficult students, now mature and on his own career path, articulated what is perhaps the best and simplest description of his mentor: "By being gracious to me, he taught me to be gracious to others."

THOMAS AND CHRISTINA LIGGETT ENDOWED SCHOLARS FUND

Christina Liggett has established a $500,000 endowment in honor of her late husband, Professor Emeritus Thomas M. Liggett, for his contributions in research, teaching and service to the UCLA Department of Mathematics. To expand the scope of this generous donation, $250,000 has been added to the endowment through the Physical Sciences Matching Gift Fund program. Beginning in 2021, and annually thereafter, four to six cash awards will go to scholars in each of two categories: Liggett Instructors (postdocs) $1,000 and Liggett Teaching Fellows (graduate students) $500.

Gateway to Success for Middle School Students of Color

Research in K-12 mathematics education has shown that completion of Algebra 1 (typically taken by the end of the 9th grade in the United States) is a key metric in determining who will graduate from high school. Only one in five students will reach this important educational milestone without Algebra 1. Nationwide, Black and Latinx students, English learners and students affected by poverty disproportionately fail Algebra 1.

Photo by Allison Shelley/The Verbatim Agency for EDUimages

In 2020, Curtis Center Executive Director Heather Dallas saw an opportunity to increase opportunities for Black and Latinx middle-schoolers in South Los Angeles when the Bill & Melinda Gates Foundation announced its Balance the Equation: A Grand Challenge for Algebra 1 grant. This call for new, innovative programs aims to improve the algebra learning experience for Black and Latinx students, English learners and/or students from economically disadvantaged homes. The center promptly submitted a proposal, the Applied Mathematics Mentorship Project (AMMP), one of over 400 submissions from 26 countries around the world.

The foundation chose 15 projects for Phase 1 of the grant in early 2021, including the The Curtis Center's AMMP, and awarded each project $100,000 to support program study and planning. Focusing on enrichment over remediation, AAMP proposed a pioneering project to position Black and Latinx students on small research teams under STEM mentors of color. By investigating scientific questions relevant to their community, the students can become doers and creators of mathematics.

In the summer of 2021, the foundation advanced AMMP to Phase 2, awarding The Curtis Center $1 million for project implementation. Under the guidance of Michelle Welford, Curtis Center director of special projects, team leaders are now working to develop and field-test the curriculum. Training for the project's teaching staff will follow. Implementation of the program is set for fall 2022.

The challenge for Curtis Center staff is to develop authentic and culturally relevant research-like experiences for students that support learning and meet the California Common Core State Standards for Mathematics as sequenced in their textbooks. Department faculty and experts from local industry and schools will contribute

immeasurable expertise. All of these efforts will culminate in the following three research investigations, which promise to provide a range of meaningful opportunities for active engagement in real-world scientific investigation:

GRADE 7 INVESTIGATION: Students will investigate environmental heat islands in their neighborhood using sensing hardware and data democratization software, designed by the Los Angeles startup company, Conservify. This topic was chosen by Travis Holder, principal of Barack Obama Global Preparation Academy and former UCLA applied mathematics alumnus.

GRADE 8 INVESTIGATION: Students will examine the impact of Covid-19 on their neighborhood, a topic suggested by Edray Goins, a Pomona College mathematics professor and South Los Angeles public school alumnus. The curriculum is being co-developed with UCLA applied mathematics professor Marcus Roper.

ALGEBRA 1 INVESTIGATION: Students will pursue mathematics questions related to the launching and docking of a spacecraft at the International Space Station. This investigation is being co-developed with a team of South Los Angeles aerospace engineers led by Dynamite Obinna, who serves as a mission management lead at SpaceX.

Within the context of these investigations, students will work on authentic questions using mathematical methods. They will first gather data using an array of tools, like data collection devices, online graphing utilities and computer simulations. Then, based on structures and patterns they observe in the data, they will develop and test models and conjectures. In a culminating event titled "Community Applied Math Night," student research teams will present their findings to an audience of parents, families, teachers and local community members. In addition, Black and Latinx mathematicians and scientists will share their personal journeys and current professional activities.

The AMMP student research teams will be guided by practicing teachers and undergraduates recruited from the UCLA Math for LA program, which trains students for careers in K-12 education. It is anticipated that over 60 percent of the undergraduate instructors will be Black or Latinx, giving the children additional and ongoing interactions with STEM mentors of color. Other undergraduate students who are interested in mathematics or science may participate in leading the student research teams as well.

Measurement of both student progress and teacher training will be conducted by The Curtis Center in collaboration with the American Institute for Research during and post-program. Measurement will be constructed to evaluate the following student outcomes: Increased proficiency with rigorous mathematics, self-identification with role models, positive experiences within a mathematics learning environment and level of excitement about pursuing STEAM careers.

AMMP ADVISORS

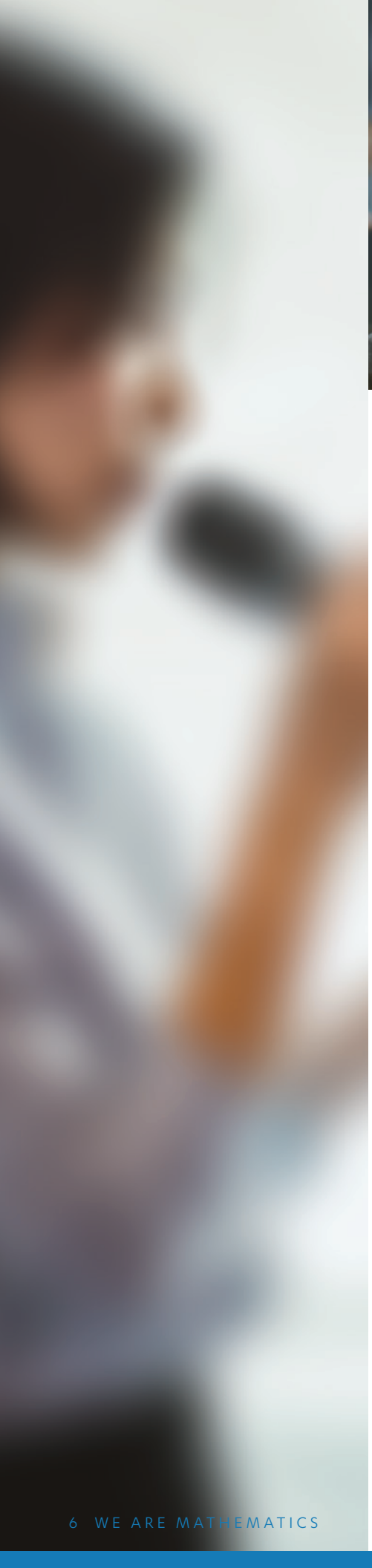
Edray Goins, Professor of Mathematics, Pomona College

Travis Holden, Principal, Barack Obama Global Preparation Academy

Dynamite Obinna, Aerospace Engineer, SpaceX

Estimated Student Enrollment and Demographics in the Applied Mathematics Mentorship Program (AMMP)

	Barack Obama Global Prep Academy	Charles Drew Middle School	Nathaniel Narbonne High School
Grade 7 estimated enrollment 2021–22	127	421	0
Grade 8 estimated enrollment 2021–22	105	389	0
Algebra 1 estimated enrollment 2021–22	153	0	581
% Hispanic students	70%	86%	65%
% Black students	27%	13%	21%
% Socioeconomically disadvantaged students	94%	91%	76%
% English language learners	32%	27%	7%



UNDERGRADUATE TOWN HALLS

As part of the new Equity, Diversity, and Inclusion (EDI) Committee established in summer 2020, faculty, postdocs, staff and students have focused on tangible solutions for creating a more inclusive environment in the Department and improved communication on all levels.

During EDI Committee meetings over the last year, the undergraduate vice chair, Michael Hill, has championed, and been successful in establishing, quarterly undergraduate town halls. He asserts, "Giving the students space to talk about the Department's decisions and the policies that impact them is key to developing solutions to the problems they experience, and it also facilitates communication between students and faculty."

While course content and sequencing are designed in the best interests of students, and data and other metrics help faculty understand learning trends, direct feedback channels enable students to convey their personal experiences in real time. Town halls serve this purpose. The Department can gain a great deal of insight from focused student input. Specifically, it can help faculty and staff understand what is being done well and where there is room for improvement. Michael adds, "Additionally, and no less importantly, town halls signal to students that there is a place where their comments, ideas and concerns can be heard."

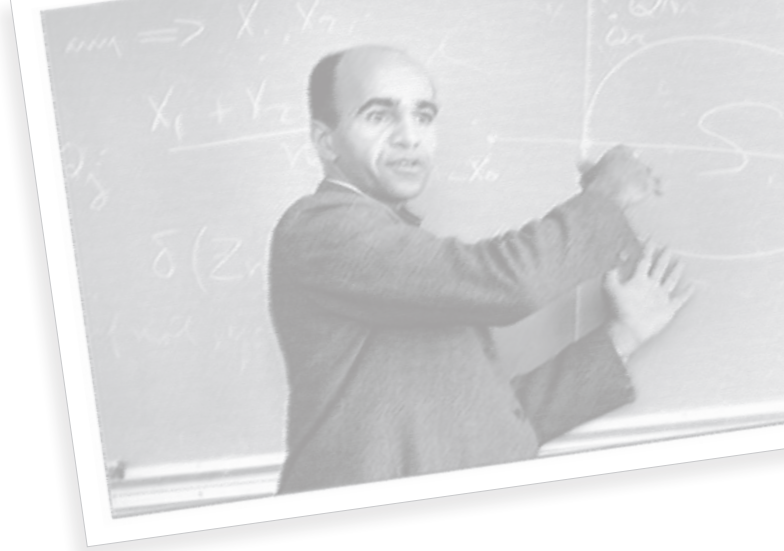
One of the concerns raised during recent town halls has been the response times for email inquiries to the Department's Student Services Office after the university made a dramatic shift to remote learning and a completely online communication model during the COVID pandemic. The small student services team understandably bore the brunt of student requests for help. Even with in-person communication options re-instituted in the 2021 fall quarter, staff receive an average of 700 incoming emails from undergraduates per workweek.

"... town halls signal to students that there is a place where their comments, ideas and concerns can be heard."

To more effectively manage these emails, the Department's IT team installed a new software platform that has two functions. It automatically sends electronic confirmations to students so they know that their emails have been received and their issues and requests are being addressed, and it enables the student services staff to view, organize and manage the emails so that they can be prioritized. The IT team was able to make this change by employing Zendesk, a cloud-based customer relations management (CRM) system that is used by many departments in the UC system. The official rollout of Zendesk in the Department took place during the 2021 winter quarter.

Continuing his term as undergraduate vice chair this year, Michael looks forward to building more opportunities for open and direct communication among faculty, staff and students. He acknowledges that some students may not feel comfortable with a town hall setting and alternatively, encourages them to email him directly (mikehill@math.ucla.edu), utilize his undergraduate vice chair office hours or submit anonymous feedback forms available on the Department website at https://ww3.math.ucla.edu/feedback/.

Blackwell Summer Research Institute



David Harold Blackwell (1919 – 2010) is widely regarded as the top Black mathematician of the 20th century. Making seminal contributions to the fields of statistics, economics, probability theory and information theory, he epitomized achievement in every field he touched. He was the seventh Black mathematician to receive a PhD in mathematics and the first Black person to be inducted into the National Academy of Sciences. In acknowledgement of his contributions, he was posthumously awarded the National Medical of Science in 2012.

His aspiration for a career in academics was an extraordinary path for a Black mathematician in the mid-1940s. "The idea at most Black colleges was to get a PhD and that was it," he remembered. Following his doctorate, he wrote 105 letters and toured 30 colleges with no advance notice, looking for a job, before finally receiving an invitation to join the faculty of Howard University. After teaching there for 10 years, he came to UC Berkeley as a visiting professor and stayed until his retirement in 1988, becoming the university's first Black tenured faculty member.

To honor his legacy, scholars Todd Coleman (Stanford), Wilfrid Gangbo (UCLA) and Jelani Nelson (UC Berkeley) established a summer research institute with two aims: increasing the number of underrepresented undergraduate students in mathematical sciences research and encouraging their participation in doctoral programs.

Following a competitive application process, the first cohort of six talented undergraduates were welcomed to the 2021 summer research program, which was offered remotely. Wilfrid Gangbo explained that they plan to rotate campuses in the future so that all three mentors' universities have the opportunity to host sessions.

The students traveled from Pomona College in California, Villanova University in Pennsylvania, the College of Wooster in Ohio, the University of Minnesota, the Massachusetts Institute of Technology, and Tufts University in the Boston area. Over the course of six weeks, they underwent immersive training and mentoring in applied probability analysis or theoretical computer science, depending on their interests, under the tutelage of Profs. Coleman, Gangbo and Nelson. During the final week of the program, they connected through their last joint Zoom meetings and shared their work. They will continue to receive advice and support from their program mentors.

Wilfrid Gangbo describes the genesis of the institute this way: "We wanted to find underrepresented undergraduate students and send them a signal that there is a large opportunity for collaboration with mathematicians and engineers and that a background in math can help them succeed in other related STEM fields. We also wanted an elite program where the student — professor ratio was as small as possible." Following the program's inaugural run, Wilfrid reported that it was a success, "A very good beginning. Next year, we hope to reach out to even more students."

INSTITUTE LEADERS

Todd Coleman
Stanford Engineering

Wilfrid Gangbo
UCLA Mathematics

Jelani Nelson
UC Berkeley EECS

David Harold Blackwell —
He epitomized achievement in every field he touched.

NEW LEADERSHIP for 'PIC'

The Department's Program in Computing (PIC) is designed for undergraduate students who would like to acquire the skills and knowledge necessary to effectively use computational tools in their educational and research activities at UCLA. Beginning with the fall 2021 quarter, Michael J. Andrews has accepted a temporary appointment as assistant adjunct professor and interim PIC director, enabling Professor Chris Anderson, the long-time PIC director, to focus on his research. Michael will oversee all administrative aspects of instruction, including the work of the PIC instructors, for approximately 2,100 students each quarter, in addition to teaching three courses per year.

Growing up in Britain, what Michael loved most in life was math, a passion that led him to an Oxford education with two prizes for "top first class degree." It was not a surprise to family and friends that he would seek further challenges abroad. He applied and was accepted to a mathematics doctoral program at the Massachusetts Institute of Technology in the USA, earning his PhD there in 2015 with a Housman Award for Excellence in Teaching.

Part of his decision to come to UCLA for his postdoc was a desire to experience Los Angeles. In addition to being a mathematician and programmer, Michael is an accomplished musician who plays mathematically constructed rhythms on his heavy-metal electric guitars, and uses his coding skills for sound design and to create audiovisual art.

While he began his postdoctoral position with a focus on research in homotopy theory, his new responsibilities as a lead instructor in the Department's undergraduate program excited him more. His enthusiasm for teaching was acknowledged with a Distinguished Teaching Award in 2017. A year later, when he needed to make his next career move, he found himself in a quandary. He had fallen in love with UCLA, the city, and Lara, who would eventually become his wife, and he did not want to leave. Fortuitously, a teaching opportunity in PIC enabled him to extend his stay.

The university-wide adjustment to teaching during the COVID pandemic has been a challenge for everyone, including the PIC staff. The physical PIC lab closed immediately, requiring a quickly reconfigured remote version that could meet the needs of students who receive services there. Michael's ongoing commitment to instructional quality throughout the ensuing 18 months led to a 2021 Liggett Instructor award for continued excellence in teaching. Michael is looking forward to getting back to campus, saying, "Computing classes are particularly suitable to remote learning, but I think the classroom is still the most enjoyable way to conduct them."

He is enthusiastic about how his team can develop and nurture the program going forward. Following an instructor training workshop organized for the 2021 fall quarter by the UCLA Center for Education & Innovation, he shared his delight with a mask-free outdoor reception where truly open communication was permissible. He affirmed, "I'm proud that our instructors care so much about teaching. This will be a hybrid year with both remote and in-class options, and I know they're prepared to put in lots of effort to improve our students' learning experiences across the board."

"Computing classes are particularly suitable to remote learning, but I think the classroom is still the most enjoyable way to conduct them."

Redesigning Linear Algebra

Rose Morris-Wright came to the Department in fall 2020 as an assistant adjunct professor to pursue postdoctoral research in geometric group theory and teach linear algebra, a mathematical tool used for calculation and analysis across a wide range of scientific topics.

Over the past year, she has emerged as an innovative scholar, modeling change by redefining the tenets of teaching this course at UCLA. After successfully presenting Department leadership with her case for modernization, she received one of the first Liggett Instructor awards. She was subsequently offered a UCLA Instructional Improvement Grant to implement a pilot project for a redesign of the curriculum for the 2021 – 2022 academic year.

Rose maintains, "Linear Algebra is an important tool for undergraduates, but unfortunately, many are not able to master it in a way that is useful because of how it is being taught right now." Her revised program will empower the 1,000+ students in her classes to learn and use this math differently.

The centerpiece of Rose's pilot program is a consequential revision of student grading. In place of traditional large-scale, all-encompassing assessments (mid-terms and final exams) she is choosing to employ small, specific tests throughout the quarter to evaluate clear-cut advances in learning as students move through the graduated process of studying this essential course.

The strategy is not new in mathematics education. Rose explains that her efforts are based on a pedagogical model that has been successfully implemented in K-12 education, called *specification grading*. The basis of the methodology is a reorganization of program content into modules linked to learning outcomes. Progress is gauged incrementally by assignments and assessments within those modules. To earn higher grades, students must demonstrate mastery of more advanced or complex skills. They may not necessarily achieve *all* of the possible learning outcomes, but their grades reflect the number of outcomes they have mastered, and unlike conventional schooling, they have opportunities to try again without penalty. The adaptation of this model to college-level learning has emerged as *mastery-based mathematical assessment*.

By measuring comprehension and proficiency through specific, progressive outcomes, this approach to teaching math is designed to create clear expectations and motivate college students to learn and excel, one step at a time. On a psychosocial level, mastery-based assessment is designed to reduce students' stress and give them more control over their progress. Because feedback is more immediate, they quickly learn from their mistakes and improve their skills through practice, which is the way that most things are learned. Rose explains that because calculation of grades is based on a uniform standard, students are not compared to each other through ranking or curving. As a result, the grades are more equitable, which increases accessibility for traditionally marginalized learners.

Rose is not a newcomer to curriculum design. During her doctoral program at Brandeis University, she was part of a project supported by a Teaching Innovation Grant to overhaul pre-calculus. She also received a University Prize Instructorship for developing and teaching "Puzzles, Games and Graphs," an undergraduate course in graph theory that incorporated play.

She describes her teaching philosophy this way: "I believe that a math community where students can reach out to each other is important to success, so I focus on group work and active learning." She is passionate about mentoring, saying, "Women mentors have brought me to this point in my career, and I think it's only fair that I give back." She is currently a member of the Association for Women in Mathematics, advising female and non-binary graduate students how to navigate life as a mathematician.

UCLA Department of Mathematics Student Services Office

ONE DAY AT A TIME

In the 2021 – 2022 academic year, the Student Services Office expects to support 25,000 student enrollments in over 400 classes, including the summer term. In addition to organizing and managing courses, the office will counsel, advise and otherwise assist students and their instructors while responding to a myriad of inquiries and requests. Then there's the record-keeping, the official reports and special Department events, including graduation and student orientation.

Six full-time staff — one manager, two graduate affairs officers and three undergraduate affairs officers — carry out all of these functions. Their jobs are challenging in scope and breadth, performed in a customer service environment. The most important part of the job is to advise students on classes and monitor their progress with counseling and careful documentation, taking into consideration individual backgrounds, needs and desires.

When addressing problems, which is the core of their work, staff must explain the situation to the student, present academic policy, lay out some options that meet policy and help the student make decisions. The staff must think independently, interpret situations correctly and adjudicate issues that may affect an academic life over the course of a quarter or even a career. As part of the process, they try to teach students to strategize and create backup plans, an important lesson for life in general.

A good example of the challenges is the class wait list, which is widely used and mostly disappointing because not enough slots are ever available. The students on a list are prioritized based on a number of factors, for instance, how close they are to graduation or whether they are math majors. Staff have to explain this policy and offer options to frustrated students who assume it is a first come, first served situation.

Counseling is an integral part of a student service officer's job, and staff often serve as sounding boards for both instructors and students, especially when it is their first time dealing with a disruptive turn of events. Sometimes students and instructors just need to talk to someone and be encouraged that everything will work out. Other times, it's a matter of helping them make difficult choices when they are struggling or having second thoughts.

Logistics is an essential tool for the student services officer because there are so many moving parts in matching up students, instructors and classes. A not uncommon scenario is the need to resolve competing needs, which often have to be addressed before the next class meets in order to avoid any impact on teaching. Resolution of these problems may involve emergency-level communications with multiple people, authorizations from leadership, notifications to students taking the affected courses, rearrangement of physical classrooms and adjustments in funding.

The Department's chief administrative officer, Ronke Epps, affirms, "The student services staff work very hard under often difficult scenarios in a high-profile role. Their contributions are fundamental to the smooth functioning of the Department and the positive experience of our mathematics students. We are very proud of the job they do."

In addition to their daily tasks, the staff collaborate with the chair and the graduate and undergraduate vice chairs, usually through working committees, on courses and policies. As the personnel with the most student contact, they provide faculty with valuable insights into the academic lives under their tutelage, and they are a unique source of practical and historical information.

One of the most important activities of the undergraduate faculty committee, specifically, is to review, develop and amend curriculum. The student affairs staff provide a strong supporting role in this process. The latest curriculum development effort arose from the new interdisciplinary data theory major, created in 2019. The staff were asked to identify and present existing math offerings that might be appropriate and provide input on the potential order of the courses, given the schedule of classes each quarter. Because the major is shared with the UCLA statistics department, there are course overlaps, so the staff member coordinated with peers from this partnering department to achieve consensus. All of this planning was accomplished within set resource parameters around funding and physical classroom availability.

Professor and Department Chair Mario Bonk reflects, "Over the last decade, enthusiasm for mathematics education has grown dramatically, resulting in more course enrollments and a number of new math majors. Our student services staff have accommodated these changes skillfully and professionally. Now as we move into a more rigorous teaching environment featuring both in-person and remote course offerings, the staff are once again quietly meeting new requirements with exemplary work."

BY THE NUMBERS

25,000	student enrollments per year, university-wide
2,800	math diagnostic tests for entering students
400	math and computing (PIC) classes
245	teaching assistant positions
114	regular and temporary faculty
6	student affairs officers

"... enthusiasm for mathematics education has grown dramatically, resulting in more course enrollments and a number of new math majors."

UCLA College | Physical Sciences
Mathematics

405 Hilgard Avenue
Box 951555, Math Sciences Suite 6363
Los Angeles, CA 90095

FROM THE CHAIR

It has been a challenging but fulfilling year as we transitioned to remote instruction for all classes under the constraints of COVID-19. We have learned much about teaching and learning and gained even more from each other. We better appreciate what we had and what we continue to enjoy and do.

I want to express my gratitude to the faculty and staff for their extraordinary efforts under very difficult circumstances and to commend all of our students on their grit and resilience.

Mario Bonk
Professor and Chair
UCLA Department of Mathematics

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Ronke Epps

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