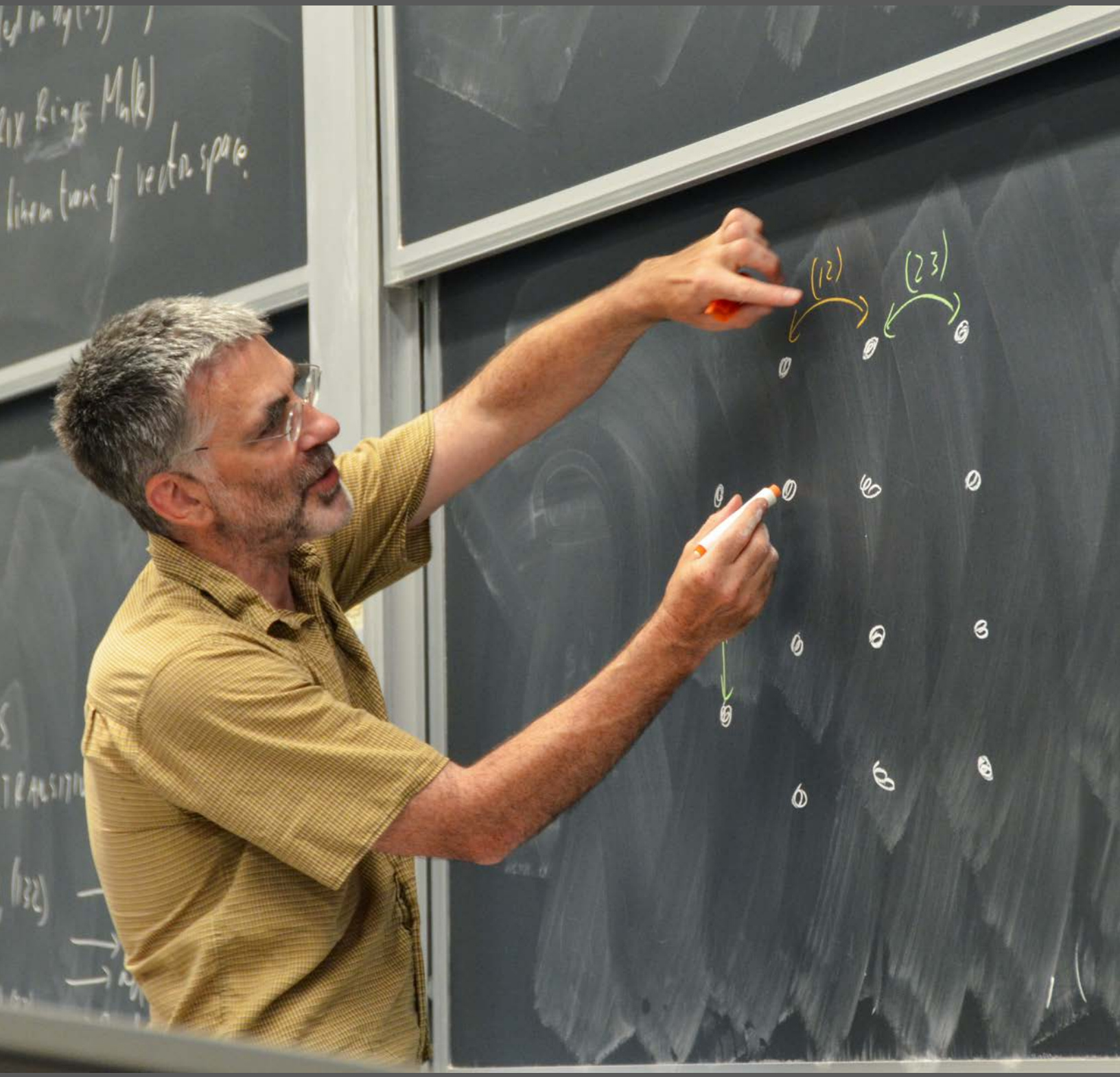
MATHEMATICS + BERKELEY

Fall 2019



IN THIS ISSUE

Letter from the Chair

Chair Michael Hutchings (PhD, Harvard, 1998) has been a member of the math faculty since 2001. His research is in low dimensional and symplectic geometry and topology. He became Chair in Fall 2019.

Dear Friends of Berkeley Math,

As the new department chair, I am very excited by all of the wonderful research, teaching, and public service in our department. Although one should not take rankings too seriously, US News & World Report most recently placed our graduate program in a tie for second place, and above all other public US universities. This is evidence of the wide renown that we enjoy, and we will be working hard to make our department even greater.

Our faculty continues to receive many prestigious honors and awards. To name just a few of the most recent ones: Lin Lin received a Presidential Early Career Award for Scientists and Engineers. Song Sun received the 2019 Oswald Veblen Prize in Geometry. David Eisenbud was awarded the 2020 AMS Prize for Distinguished Public Service.

As far as teaching is concerned, demand for our classes is enormous. Last year we had a total enrollment of approximately 20,000, and a peak of over 1,000 math majors. We are delighted that so many students want to learn mathematics, and we are committed to not restrict access to our classes or the major. At the same time it is a challenge to meet the pedagogical needs of this large and diverse group of students. To help meet this demand, over the next few years we will be busy hiring to increase the size of our faculty, while maintaining our high standards.

This year we are very pleased to welcome three new distinguished faculty to the department. Sylvie Corteel, who works in combinatorics, and Melanie Matchett Wood, who works in number theory, are joining the department as Full Professors. Sung-Jin Oh, who works in partial differential equations, is joining the department as an Assistant Professor.

This year we also welcomed an outstanding new class of 27 graduate students, including 12 international students from 8 countries. The diverse perspectives of our graduate students bring fresh ideas to our department in both research and teaching, and are essential to the future of the mathematical profession.

Our department could not function without the tireless dedication of the staff. I wish to especially thank our Computer Systems Administrator, Igor Savine, who is retiring; and our Department Manager Holli Griffin Strauss, Graduate Student Advisor Vicky Lee, and Undergraduate Advisor Blaine Jones, who are moving to higher positions in the university.

We continue to be involved in outreach to hundreds of K-12 students, mostly through the Berkeley Math Circle, and also via the Julia Robinson Mathematics Festival. This year's festival will take place on December 7, 2019, and is part of a series of activities in honor of Julia Robinson's 100th birthday. Other activities include a symposium on her research at MSRI, and a public lecture by Lenore Blum on December 9, 2019.

In other news, our home, Evans Hall, is due for replacement. Active discussions are underway as to what the new home of the mathematics department will look like.

I encourage you to stay connected with the department and with Berkeley. You can learn more about the many activities in the department on our homepage and the UC Berkeley Mathematics Facebook page, and you can join current and former students in the UC Berkeley Mathematics LinkedIn group.




Vice Chairs: Thomas Scanlon (Equity Advisor), Constantin Teleman (Faculty Affairs), Sug Woo Shin (Graduate Affairs), Per-Olof Persson (Undergraduate Affairs)

Students in Richard Borcherds' Math 250A class (Photo: Ben Ailes)

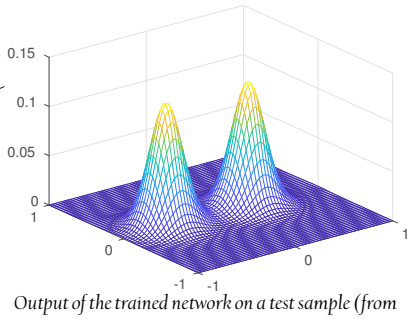
Data Science in the Math Department

It is hard to define data science, but easy to notice its pervasive influence on scientific, economic, and social life in 2019. UC Berkeley is one of the nerve centers of this field, both in teaching and research. Our department plays a crucial role in this story on both fronts.

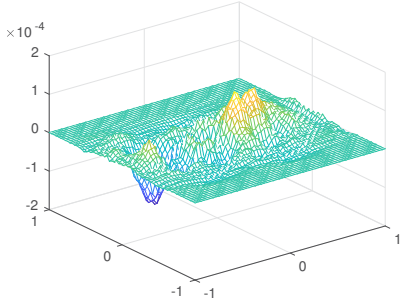
The mathematical foundations of data science are linear algebra, calculus, and probability. With the Division of Data Science's DS Major and Minor rapidly gaining popularity, the most immediate effect on our department is vastly increased enrollments in Calculus 1A/B and Math 54. For instance, it is now standard to have over 3500 students take Math 54 every year, up from under 2000 ten years ago. Beyond the size of the course, the curriculum is also being revamped to better serve the needs of these students — e.g., the Singular Value Decomposition, which used to be a fringe topic, is now taught in detail, often with demonstrations of applications to sound and image compression.

Within the applied math major, we offer since 2017 a "Data Science Cluster", with choices from several upper division CS and Statistics courses. This was by far the most popular choice among our majors last year, accounting for over 20 percent of them. At the graduation ceremony this spring, about 20 percent of our undergraduates went on to careers or graduate schools directly related to DS.

In research, mathematics offers a different perspective on data science from Statistics and CS. One concrete example is the research of Prof. Lin Lin, which uses deep neural networks to efficiently find solutions to nonlinear partial differential equations arising in quantum chemistry. It has been understood for some time how to represent the solution map efficiently in the linear case, using products of certain hierarchical matrices which decompose the relevant space by recursively bisecting it into smaller and smaller grids, but it was a mystery how to do this in the nonlinear case. Lin and his colleagues generalized this approach to the nonlinear setting by using a neural network architecture – essentially a product of the same kinds of matrices, but with nonlinearities interleaved between products. The architecture is trained using known solutions of the PDE as examples; the surprise is that these nets seem to learn the highly structured solution maps without overfitting.



Output of the trained network on a test sample (from Fan, Lin, Ying, Zepeda-Nunez, 2018)

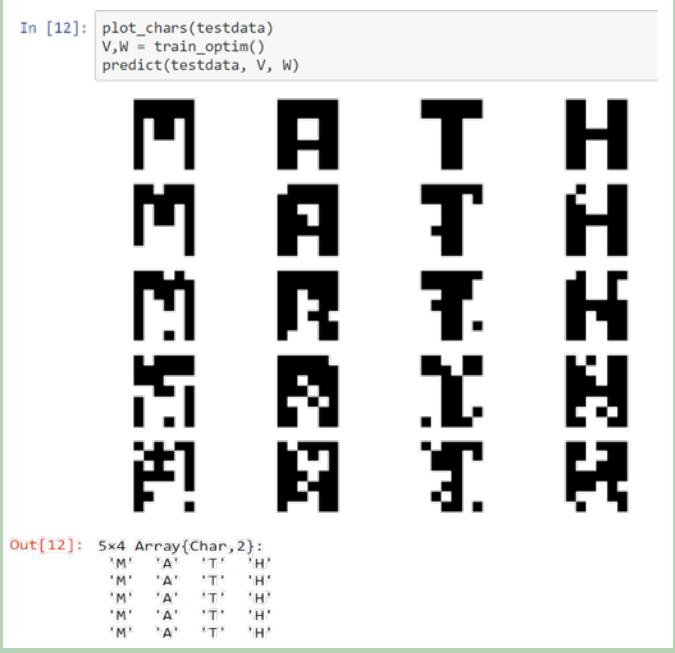


Error with respect to the reference solution (from Fan, Lin, Ying, Zepeda-Nunez, 2018)

Another example is the research of Prof. James Sethian. Deep Learning is famously good at classifying images using a huge number of examples, which are cheaply available on the internet. Sethian and his group study the problem of designing classifiers for very high resolution images of cells. The issue is that it is far more expensive to collect and annotate images of cells than it is for natural images such as cats and dogs, so the number of examples is tiny (perhaps 10). To train neural nets in this "small data" setting, they severely restrict the structure of the nets to have very few parameters, in a way informed by multiscale analysis. The result, known as "Mixed Scale Dense" networks, are good at extracting and classifying structures within cellular images obtained from cryo electron microscopy, and are being used, for example in a Chan-Zuckerberg joint UCB/Stanford/UCSF initiative for understanding parasite invasion. (Nikhil Srivastava)

New course: Math 124 - Programming for Mathematical Applications

To address the increasing demand for programming in both industry and academia, Prof. Per-Olof Persson has designed a new undergraduate course for introduction to programming with an emphasis on applications in mathematics. Based on the new Julia language, it covers all the basic programming concepts while demonstrating applications in a wide range of fields including number theory, combinatorics, statistical analysis, computational geometry, Fourier analysis, optimization, and machine learning. The course was given as a small trial in spring 2019, and because of a strong interest from the students it will be offered again in spring 2020 as a large lecture class. For more details, visit the course web page persson.berkeley.edu/math124.



Optical Character Recognition (OCR) using a Deep Neural Network (Math 124 project).

DEPARTMENT NEWS

Distinguished Lectures

- The 2018-19 Serge Lang Lecture was given by **Helene Barcelo** of MSRI, with a lecture entitled *"Distinguishing shapes via topology."* The 2019-20 Serge Lang Lecture will be given on November 22, 2019, by **Persi Diaconis** of Stanford University, on *"Adding numbers and shuffling cards."*
- The 2018-19 DiPerna Lecture was given by **Gunther Uhlmann** of the University of Washington, with a lecture entitled *"Seeing Through Space-Time."* The 2019-20 DiPerna Lecture will be given by **Carlos Kenig** of the University of Chicago.
- The 2019 Alfred Tarski Lectures were given by **Thomas Hales** of the University of Pittsburgh. The three lectures were entitled *"A formal proof of the Kepler conjecture"*, *"Formalizing mathematics"* and *"Integrating with Logic."*
- The 2018-19 Chern Lectures were given by **Assaf Naor** of Princeton University, with a series entitled *"Quantitative embeddability, obstructions, and applications."* The 2019-20 Chern Lectures will be given by **Manjul Bhargava** of Princeton University.
- The 2018-2019 Bowen Lectures were given by **Christopher Hacon** of University of Utah and **James McKernan** of MIT, on *"Geometry of Algebraic Varieties."* The 2019-2020 Bowen Lectures will be given by **Efim Zelmanov** of UCSD.

Faculty Honors

- Professor **Suncica Canic** was selected to become a Fellow of the American Mathematical Society.
- Morrey Assistant Professor **Tim Laux** won the Otto Hahn medal of the Max Planck Society.
- Associate Professor **Lin Lin** won the Presidential Early Career Award for Scientists and Engineers.
- Professor **Nicolai Reshetikhin** became a Senior Fellow at ITS-ETH Zürich.
- Professor **Chris Shannon** was elected to the American Academy of Arts and Sciences.
- Professor **Ted Slaman** became a Fulbright Specialist.
- Professor **Song Sun** was awarded the 2019 Oswald Veblen Prize in Geometry.
- Professor **Maciej Zworski** won the 2019 Sierpinski Medal of the Polish Mathematical Society.

In Memoriam

Professor Emeritus John Tate

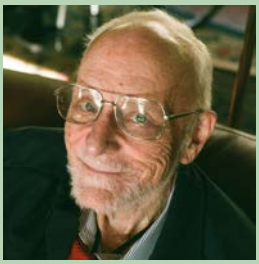
John Tate, a giant of mathematics, died in Lexington, Massachusetts on October 16, 2019 at the age of 94.

Tate was a number theorist, geometer and algebraist—but that short description gives little hint of the breadth or depth of his contributions to mathematics. Over his long and fruitful career, Tate continually introduced new techniques, new perspectives and new constructions. A search for "Tate" among the titles of articles published in 2019 points to structures, theorems and conjectures that bear his name: Lubin–Tate extensions, Mazur–Tate p-adic σ-functions, Néron–Tate heights, and on and on.

Tate received numerous prizes and awards over the years, including the Abel Prize and the Wolf Prize. He was a wonderful PhD advisor; his former students include Berkeley faculty members Andrew Ogg, George Bergman and this writer. Many of Tate's former students are prominent mathematicians in their own right. The Mathematics Genealogy Project associates Tate with 42 PhD students and 678 mathematical descendants.

Tate was beloved for his generosity and humility. In the text that he provided to Mariana Cook for her book *Mathematicians*, he wrote: "I got the idea that there was no point in being a mathematician if one weren't a genius. I knew I wasn't." He will be missed by his family, his students, his colleagues and the entire mathematical community. John Tate was wrong about one thing: he *was* a genius.

(Professor Ken Ribet)



Professor Emeritus Elwyn Berlekamp

Elwyn Berlekamp, Professor Emeritus of Mathematics and EECS, died at his home in Piedmont on April 9, 2019, at the age of 78.

Berlekamp's interests were unapologetically broad. His work on algebraic coding theory in the 60's laid the theoretical foundations of the field, producing along the way mathematical gems such as his famous algorithm for factoring polynomials over finite fields. His codes became the NASA standard for space communications and were used by Voyager II to beam back crisp images of the solar system. At age 37, he became the youngest ever member of the National Academy of Engineering.

Berlekamp's other passion was the mathematical theory of games. A lifetime favorite was Dots and Boxes, for which he discovered a surprisingly deep winning strategy. His four-volume work "Winning Ways" with Conway and Guy was called the "greatest contribution to 20th century recreational mathematics" by Martin Gardner, and his two volume "Mathematical Go" was one of the few works on the topic to be translated into Japanese.

In 1989, at the suggestion of his friend Jim Simons, Berlekamp became the CEO of a failing hedge fund, Axcom. He redesigned its algorithms, yielding a 55% return the following year, and sold his interest back to Simons to return to teaching at Cal. The fund continued to perform well, and became part of Renaissance's legendary Medallion fund.

Berlekamp was a key supporter of MSRI during its early years, serving as the chair of its board in 1994-98. He received many awards, including the Hamming Medal in 1991.

GRAD AND UNDERGRAD NEWS

Graduate Student Honors

- Albert Ai and Alexander Appleton received the 2018-19 Herb Alexander Prize, awarded for outstanding dissertations in pure mathematics.
- The 2018-19 Bernard Friedman Memorial Prize in Applied Mathematics was awarded to Anna Seigal.
- Benjamin Gammage received the Kenneth Ribet & Lisa Goldberg Award in Algebra.
- Catherine Cannizzo was awarded the 2018-19 Nikki Kose Memorial Teaching Prize.
- Former PhD student Xinwen Zhu won a 2020 New Horizons in Mathematics Prize, for work in arithmetic algebraic geometry.
- Albert Ai, Paula Burkhardt-Guim, Lauren Cranton Heller, James Dix, Magda Hlavacek, David Keating, Jeffrey Kuan, Kathleen LaMont, Jeffmin Lin, Harry Main-Luu, Adele Padgett, James Rowan, Anna Seigal, Andrew Shi, Liyu Xia, Dylan Yott, and Roy Zhao received 2018-19 Outstanding Graduate Student Instructor Awards.

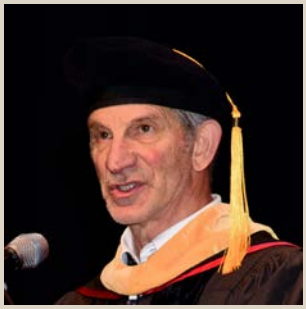
Undergraduate Student Honors

- Doron Grossman-Naples was awarded the 2018-19 Departmental Citation and the 2019 Paul Chernoff Memorial Prize.
- Fei Yu Chen, Nikolay Grantcharov, Yimin Lin, Harry Liu, Matthew Nicoletti, Patrick Oare, Indraneel Tambe, Liyang Zhao, and Qiyi Zhao were awarded the Dorothea Klumpke Roberts Prize in Mathematics in recognition of their truly exceptional scholarship.
- Samantha Hao, James Hulett, Man Chon Iao, Grant Posner, Yixin Shen, and Xinchen Xu were awarded the Percy Lionel Davis Award for Excellence in Scholarship in Mathematics.

(Photo: Vicky Lee)

2019 Commencement

The Department of Mathematics' 2019 Commencement Ceremony took place on May 23 in Zellerbach Auditorium. The speaker was Professor Peter Sarnak of Princeton University and the Institute for Advanced Study. At the ceremony, 368 mathematics and applied mathematics majors received undergraduate degrees, while 27 graduate students received Masters and PhDs; a number of departmental prizes (both graduate and undergraduate) were also awarded.



Professor Peter Sarnak (Photo: GradImages)

- Congratulations to the UC Berkeley team Junhao Fan, Ray Li, and Jonathan Xia, for earning Honorable Mention honors in the 2018 William Lowell Putnam Mathematical Competition. Junhao Fan also received an honorable mention, and Jiannan Jiang finished in the top 200 (out of 4,623 competitors). UC Berkeley had more students place in the top 500 than any other public school in the United States.
- Samantha Hao and Harry Main-Luu were both named Runner-Up for the 2019 University Medal.
- Yuhan Jiang was selected as Runner-Up of the 2020 AWM Alice T. Schafer Prize.

Berkeley connect

Berkeley Connect is a mentoring program for undergraduates, offered as a 1-credit course every semester. Its goals are to increase the sense of community and belonging at Berkeley, especially for transfer, international, and underrepresented minority students, who constitute about 75% of the typically 80-120 total enrollments. We do this primarily by having many small group dinner discussions of 20 students around but not directly about math: topics from last semester included the history and sociology of math, and the mathematical creative process. We also have several panels, for instance one bringing back department alumni at various stages of their careers, and another (joint with MUSA) in which students and faculty shared their experiences with impostor syndrome.

The program is run by two faculty members and 2-3 graduate student fellows. 91% of participants said the program increased their sense of belonging at Berkeley, and statistics suggest that participation in BC significantly lowers dropout rates and increases GPA.

Congratulations to our students who received their PhDs this past academic year!

Russell Ahmed-Buehler "A Logical Theory of Confirmation" under Lara Buchak.

Albert Ai "Low Regularity Solutions for Gravity Water Waves" under Daniel Tataru. Albert is now a Postdoc at University of Wisconsin–Madison.

Alexander Appleton "Singularities in U(2)-invariant 4d Ricci flow" under Richard Bamler and Jon Wilkening. Alexander is now at McKinsey & Company.

Frank Ban "Sketches and Traces" under Christos Papadimitriou and Luca Trevisan.

Catherine Cannizzo "Homological mirror symmetry for the genus 2 curve in an abelian variety and its generalized Strominger-Yau-Zaslow mirror" under Denis Auroux. Catherine is now a Postdoc at Stony Brook University.

Alexander Carney "The arithmetic Hodge-index theorem and rigidity of algebraic dynamical systems over function fields" under Xinyi Yuan. Alexander is now a Postdoc at University of Rochester.

Kai-Chieh Chen "Kashaev-Reshetikhin Invariants for SL2(C) at Roots of Unity" under Nicolai Reshetikhin. Kai-Chieh is now at Wells Fargo.

Kevin Donoghue "A Spin TQFT Related to the Ising Categories" under Ian Agol.

Maryam Farahmand-Asil "The Arithmetic of Graph Polynomials" under Matt Beck and Mark Haiman. Maryam is now a Faculty at Mills College.

Benjamin Filippenko "Polyfolds and Persistence" under Katrin Wehrheim. Benjamin is now a Postdoc at Stanford University.

Daniel Fremont "Algorithmic Improvisation" under Sanjit Seshia. Daniel is now a Postdoc at UC Berkeley, and will begin a faculty position at UC Santa Cruz.

Benjamin Gammage "Microlocal sheaves and mirror symmetry" under David Nadler. Benjamin is now a Postdoc at Harvard University.

Felix Gotti "Matroids and convex geometry in combinatorics and algebra" under Lauren Williams. Felix is now a Postdoc at University of Florida.

Eric Hallman "Error Estimates for Least-Squares Problems" under Ming Gu. Eric is now a Postdoc at NC State University.

Andrew Hanlon "Monodromy of Fukaya-Seidel categories mirror to toric varieties" under Denis Auroux. Andrew is now a Postdoc at Stony Brook University.

Jeff Hicks "Tropical Lagrangians and Homological Mirror Symmetry" under Denis Auroux. Jeff is now a Postdoc at the University of Cambridge.

Kenneth Hung "Topics in Conditional Inference" under William Fithian and David Aldous. Kenneth is now at Facebook.

Jonathan Leake "Analytic and Combinatorial Features of Stable Polynomials" under Olga Holtz. Jonathan is now a Postdoc at KTH.

Michael Lindsey "The Quantum Many-Body Problem: Methods and Analysis" under Lin Lin. Michael is now a Postdoc at Courant Institute of Mathematical Sciences, NYU.

Dominique Maldague "A constrained optimization problem for the Fourier transform" under Michael Christ. Dominique is now a Postdoc at MIT.

Christopher Miller "On the k-Schur Positivity of k-Bandwidth LLT Polynomials" under Mark Haiman. Christopher is now at Ancestry.

James Moody "Computable Continuous Structure Theory" under Ted Slaman.

Cristian Mihai Munteanu "Nontrivial tori in spaces of symplectic embeddings" under Michael Hutchings. Cristian is now a Postdoc at Humboldt-Universitat, Berlin.

Chanwoo Oh "Metastability of Zero Range Processes" under Fraydoun Rezakhanlou. Chanwoo is now a Postdoc at Instituto Nacional de Matemática Pura e Aplicada.

Kevin O'Neill "Multilinear and Sharpened Inequalities" under Michael Christ. Kevin is now a Postdoc at UC Davis.

Nick Ryder "Combinatorial and Algorithmic Aspects of Hyperbolic Polynomials" under Nikhil Srivastava. Nick is now at OpenAI.

Anna Seigal "Structured Tensors and the Geometry of Data" under Bernd Sturmfels. Anna is now a Postdoc at University of Oxford.

Chen Shen "Fluctuation Analysis of Order Positions Under General Cancellations" under Steve Evans.

Minseon Shin "Computations of the cohomological Brauer group of some algebraic stacks" under Martin Olsson. Minseon is now at Max Planck Institute for Mathematics.

Ryan Thorngren "Combinatorial Topology and Applications to Quantum Field Theory" under Vivek Shende. Ryan is now at Weizmann Institute of Science.

Morgan Weiler "Mean action of periodic orbits of area-preserving annulus dieomorphisms" under Michael Hutchings. Morgan is now a Postdoc at Rice University.

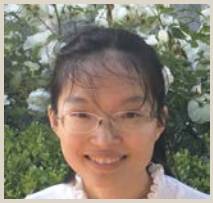
Jianwei Xiao "Spectrum-Revealing Randomized Matrix Factorization: Theory and Algorithms" under Ming Gu. Jianwei is now at Facebook.

Dylan Yott "Special Cycles on GSpin Shimura Varieties" under Xinyi Yuan. Dylan is now at Morgan Stanley.

Alexander Youcis "The Langlands-Kottwitz method and deformation spaces of p-divisible groups of abelian type" under Sug Woo Shin. Alexander is now a Postdoc at Institute of Mathematics, Polish Academy of Sciences.

Qiuyi Zhang "Fast Algorithms for Interior Point Methods" under Satish Rao and Nikhil Srivastava. Qiuyi is now at Google.

GRADUATE STUDENT PROFILES



Yi Lai is a fourth year Ph.D. student working under the supervision of Professor Richard Bamler. She obtained her undergraduate degree from Peking University. Yi's research lies in geometric analysis. In particular, she proved the existence of local Ricci flow under several almost non-negative curvature conditions. With the generous support by the 2018 spring fellowship, Yi was able to made better progress on her recent research.

Milind Hegde is a fourth year PhD student working under the supervision of Alan Hammond. He has spent significant amounts of his life in both India and the Bay Area, before finding himself back in the Bay for graduate school after earning a Bachelor of Science degree at the Indian Institute of Science in Bangalore. He works in an area of probability theory called stochastic growth models, and his research focuses on developing robust probabilistic and geometric techniques to address questions which have typically relied on delicate exact computations in specific special models.

New Faculty

Sylvie Corteel

Sylvie Corteel is a Professor in our department starting Fall 2019. Corteel obtained her PhD from Université Paris Sud in 2000 and her Habilitation from Université Paris Diderot (Paris 7) in 2010. She has been a CNRS researcher since 2001 and was promoted Directrice de Recherche at CNRS in 2011. She came to Berkeley on sabbatical in 2017-2018 after visiting Lauren Williams several times thanks to the France Berkeley fund. She has been a Simons Research Professor at MSRI and a visiting Miller Professor at the Miller Institute. Corteel's research is in combinatorics and its interactions with statistical mechanics, probability and algebra. Corteel really enjoys working with the graduate and undergraduate students of the department.

Sung-Jin Oh

Assistant Professor Sung-Jin Oh moved to Berkeley in Fall 2019. Oh's research concerns understanding the long term behavior and singularities of solutions to nonlinear wave equations in mathematical physics, including the Einstein equation and the Yang-Mills equation. Oh obtained his PhD from Princeton University in 2013 under the supervision of Sergiu Klainerman. He was a Miller Research Fellow from 2013 to 2016, and a CMC Research Professor at the Korea Institute for Advanced Study from 2016 before Fall 2019.

Melanie Matchett Wood

Professor Melanie Matchett Wood comes to Berkeley from the University of Wisconsin, Madison. Wood studies questions in number theory, especially statistical questions about number fields and their class groups, using tools from algebraic and analytic number theory, algebraic geometry, topology, probability, and random groups. Wood obtained her PhD at Princeton University in 2009, under the supervision of Manjul Bhargava. She was an AIM Five Year Fellow and a Szegö Assistant Professor at Stanford before joining the faculty at Wisconsin in 2011. Wood was awarded a Packard Fellowship for Science and Engineering in 2015 and the AWM-Microsoft Research Prize in Algebra and Number Theory in 2018.

Faculty Promotions

Professor Per-Olof Persson was promoted to Full Professor.

New Morrey Visiting Assistant Professors

Yu-Wei Fan (Algebraic geometry, dynamical systems, and mathematical physics), PhD Harvard University, 2019.

Di Fang (Numerical analysis, computational chemistry and biology), PhD University of Wisconsin-Madison, 2019.

Nicholas Miller (Hyperbolic geometry, low dimensional topology), PhD Purdue University, 2017.

Peng Zhou (Mathematical physics, mirror symmetry, constructible sheaves), PhD Northwestern University, 2017.

New Visiting Faculty, Postdocs, and Lecturers

Erik Bates (Probability, statistical mechanics, mathematical physics), PhD Stanford University, 2019. NSF postdoc.

Sebastian Eterović (Arithmetic geometry, model theory), PhD U. Oxford. RTG Postdoc.

Gabriel Goldberg (Set theory, large cardinals, inner model theory), PhD Harvard University, 2019. NSF postdoc.

Joshua Greene (Symplectic Geometry and Topology), PhD Boston College. Simons Fellow.

Francois Labourie (Number Theory), U. Nice Sophia Antipolis. Chancellor's Professor..

Alexander Shapiro (Quantum groups, representation theory), PhD UC Berkeley. NSF postdoc / lecturer.

Arun Sharma (Combinatorics, Ramsey theory, error-correcting codes), PhD UC Berkeley. Lecturer.

Antoine Song (Mathematical Analysis), PhD Princeton University. Clay Fellow.

Martin Speirs (Topological Hochschild homology, algebraic K-theory), PhD University of Copenhagen, 2018. Postdoc.

Philip Matchett Wood (Probability theory, combinatorics), PhD Rutgers University. Lecturer.

Staff News

Over the last year the Department had both comings and goings of staff members. Staff departures include: The retirement of Igor Savine, Information Systems Analyst, who will retire at the end of December. Award winning Graduate Advisor, Vicky Lee, accepted a promotion opportunity as Director of Graduate Student Funding in Graduate Division. Also accepting a promotion on campus was Undergraduate Advisor, Blaine Jones. Lastly, Department Manager Holli Griffin Strauss accepted a position as Assistant Dean in Social Sciences.

In 2019 the Department welcomed Graduate Advisor Jon Phillips. Jon joined the Department in November 2019 after previously serving in another student services role at Cal.

University of California, Berkeley
Department of Mathematics
970 Evans Hall #3840
Berkeley, CA 94720-3840

Nonprofit Org.
U.S. Postage
PAID
University of
California Berkeley

MATHEMATICS + BERKELEY

FALL 2019 NEWSLETTER

Entering class of graduate students 2019 (Photo: Vicky Lee)

A Note on Strategic Priorities

The Department of Mathematics is working hard to maintain its excellence in all aspects of research and education and to bridge the resource gap that separates us from our better-funded peers. For this we continue to rely on donations from alumni and friends of the department. Here are some of the department's current top priorities:

- **Graduate Student Fellowships** are needed to enable the department to make competitive, attractive offers to the very strongest applicants to our graduate program, who are often being lured by our private peers with offers of higher stipends and lower teaching loads.
- **Endowed Faculty Chairs** are needed in order to improve the department's ability to make competitive offers for the recruitment and retention of world-class faculty.
- **Research Visitor Funds** make it easier to invite high-profile visitors to come to Berkeley to deliver lectures in our department or collaborate with our faculty. These intellectual exchanges are of tremendous value to our research and education.

Besides these specific goals, we welcome gifts to the department's discretionary fund, which give the Chair of the department much-needed flexibility in funding graduate student recruitment, parts of the faculty recruitment process, research travel for graduate students, and many other initiatives that make our program competitive and rewarding.

We invite you to join us in keeping UC Berkeley Mathematics strong through your gifts to the department. All donations, large or small, are greatly valued. You may choose whether to direct your gift toward a specific goal of your choice or to have your donation used for our most pressing needs at the department's discretion.

For further information, please contact Development Directors Nicholas Cole, e-mail: ncole@berkeley.edu or Maria Hjelm, e-mail: mhjelm@berkeley.edu, or Department of Mathematics Chair Prof. Michael Hutchings, e-mail: chair@math.berkeley.edu.

Newsletter Contributors: *Editors:* Per-Olof Persson and Nikhil Srivastava. Thanks to Michael Hutchings, Melanie VandenBerghe, Vicky Lee, Jennifer Sixt, Christine Tobolski and Holli Griffin Strauss. *Photography:* mostly George Bergman. *Cover*: Prof. Richard Borcherds (Photo: Ben Ailes).

Berkeley

MATHEMATICS + BERKELEY

The Department of Mathematics wishes to thank all alumni, parents, students, faculty, staff and friends who support the department.

You may return this form to:

UC Berkeley Foundation
University of California, Berkeley
Donor and Gift Services
1995 University Avenue, Ste 400
Berkeley, CA 94704-1070

Your Gift Is Welcome!

❑ Enclosed is my gift of $_____
Please make your tax deductible gift for the Department of Mathematics payable to "UC Berkeley Foundation."

❑ $5000 ❑ $1000 ❑ $500 ❑ $250 ❑ $100 ❑ Other $_____

In addition, (company name) _____ will match my gift.
The company matching gift form ❑ is enclosed ❑ will be mailed

❑ Please direct my gift to the Department of Mathematics Annual Fund, to be used for the Department's greatest need at the Chair's discretion (Fund #N7221).

❑ I prefer to designate my gift for undergraduate scholarships (Fund #N7284).

❑ I prefer to designate my gift for graduate student fellowships (Fund #N7398).

❑ Send me information on charitable estate and gift planning or on establishing an endowment.

Print Name _____ Signature _____ Date _____

Address _____

E-mail* _____

Please provide your e-mail address so we can send you future issues of this newsletter.

You can also donate to the Department of Mathematics online at:

https://math.berkeley.edu/donate

The information you provide will be used for University business and will not be released unless required by law. A portion of all gifts is used to defray the costs of administering the funds. All gifts are tax-deductible, as prescribed by law.

Thank You For Your Gifts!