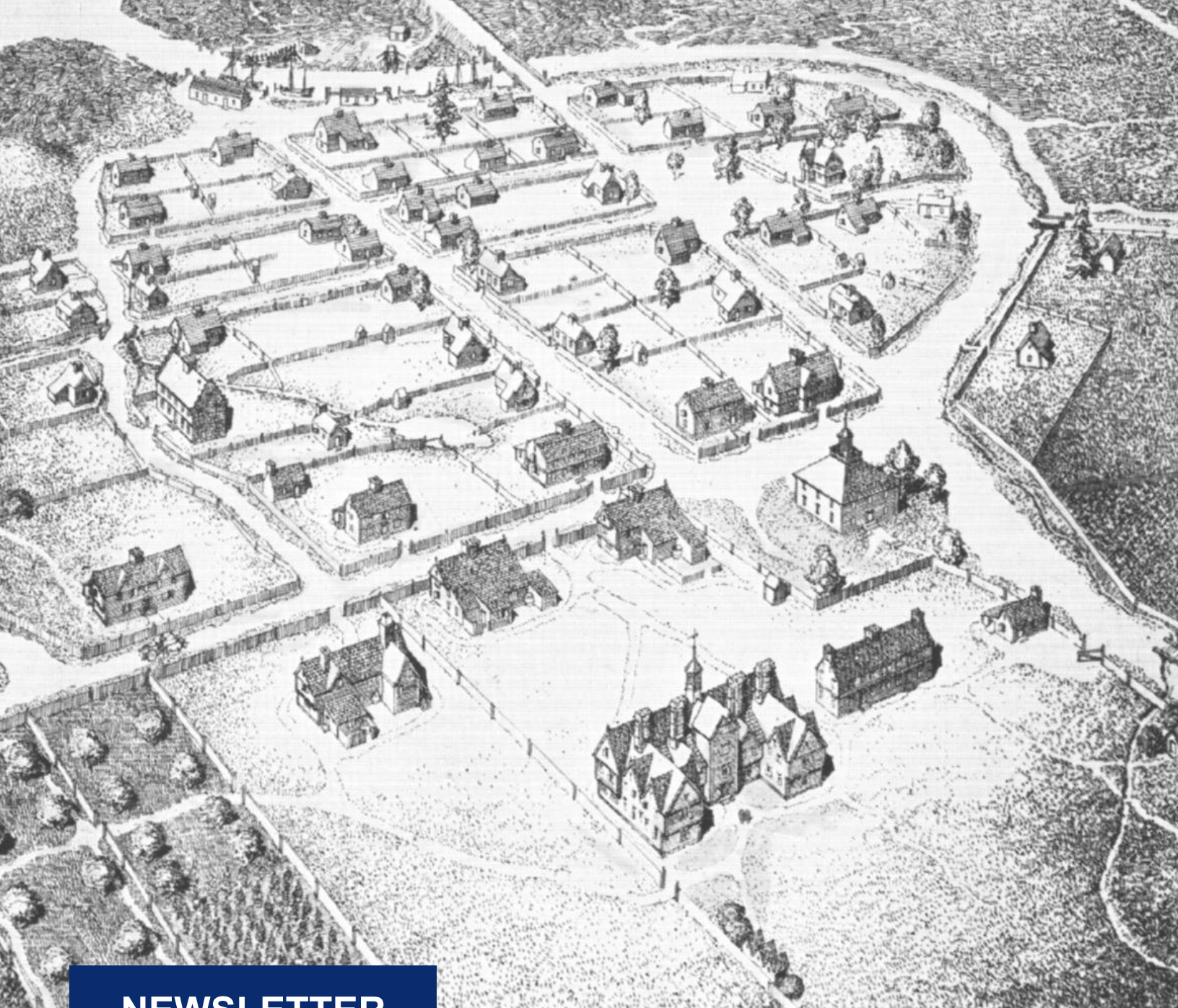

NEWSLETTER

MATHEMATICS

Harvard University Department of Mathematics

Academic Year 2025–2026

DEPARTMENT OF MATHEMATICS
HARVARD UNIVERSITY

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Message From the Chair

Joe Harris

Higgins Professor of Mathematics

Mathematics Department Chair

Dear Friends of the Harvard Math Department,

It has been another eventful and exciting year for the math department. The number of our students continues to grow and our hallways, classrooms, and common room seem always to be filled with people talking about mathematics and other things.

This has been, as you know, a time of great ferment and uncertainty for the University and the Department of Mathematics in particular. In such times, it's worthwhile to recall the history of the department, and how we went from a relative backwater in the 19th century to our current position of preeminence in math. To this end, our Communications Specialist Anastasia Yefremova has written a fascinating article about the emergence of the department, which you can read below.

In the meantime, business is booming. We have more math concentrators than ever; a growing number of concentrators in math-adjacent fields are taking our advanced courses and—under Brendan Kelly's direction—our introductory math classes are helping students gain access to the world of mathematics.

On a sadder note: I regret to announce the passing of two longstanding pillars of the math department, Benedict Gross and Heisuke Hironaka, about whom you can read more in the following pages. We are planning to host a conference March 15-19, 2027 in memory of Dick's work in number theory and representation theory.

Our faculty continue to receive high recognition. This past year, H.-T. Yau won the Steele Prize; Lauren Williams was awarded the MacArthur Fellowship, and Laura DeMarco has been appointed the Hollis Professor of Mathematicks and Natural Philosophy, effective July 1, 2025. The Hollis Professorship was established in 1727 by Thomas Hollis; it is the second oldest named Chair at Harvard (as evidenced by the spelling of "Mathematicks").

This was the second year of the newly created Benedict H. Gross Distinguished Visitor Program, funded by a generous donation from Will Hearst. Will's vision is that this will allow us to bring to Harvard both leading figures in mathematics, and rising stars with whom we wish to build a connection. This allowed us to welcome Peter Sarnak of Princeton and Robert Lazarsfeld of Stonybrook, who gave wonderful lectures on their work and others' (Lazarsfeld is the subject of a profile below). Next year, we will welcome Daniel Litt of Toronto and in 2028 Jonathan Pila of the University of Oxford.

We also have very good news about the Center of Mathematical Sciences and Applications (CMSA): pending funding, some time in the next year the CMSA will be relocating from their present offices at 20 Garden Street to the Science Center. (The Math Department is also getting additional space in the newly reconfigured Science Center, to be used for additional offices, as well as classroom and seminar rooms.) The physical proximity is huge: there are many mathematical institutes associated with math departments (SLMath and Berkeley; ICERM and Brown, IAS and Princeton), but none have the institutional ties or physical proximity that we will now have.

Elsewhere in this year's newsletter, you will find profiles of several members of our community, and pieces highlighting the accomplishments of others. I hope you enjoy reading about some of the wonderful things that happened in our department.

Finally, this is my first year as chair. I am honored and humbled to have been trusted to head this remarkable department. I am confident that together we can navigate our way through the current time of uncertainty and upheaval.

With Best Wishes,

A Historical Retrospective

The Evolution of the Harvard Department of Mathematics

Conjectural view of Harvard College and Cambridge in 1668. Hamilton Vaughan Bail, Views of Harvard, A pictorial Record to 1860.

Though it's a household name these days, the beginnings of Harvard University—then Harvard College—were certainly humble: established in 1636, it consisted of one 'master,' nine students, and a farmhouse on what was little more than an acre of cow pasture land. Math has been taught at Harvard nearly from the beginning – since 1638, when it was introduced as a direct inheritance from the English universities. The first Ph.D. Harvard ever awarded was in mathematics. During the course of almost 390 years, what eventually became the Department of Mathematics has shaped and, in turn, been shaped by the tides of history.

It is beyond the scope of this simple article to fully flesh out every significant moment or person of importance to the department. Entire books have been written—and more are likely to be written in the future—including detailed accounts of the evolution of mathematics as a discipline at Harvard. In fact, it is our hope that the following pages inspire you to dig deeper. To that effect, we have included a short list of suggested further reading that we hope you find useful. What this article does seek to do, however, is to bring the 20th century into focus.

Initiatives and actions undertaken during this time period set the course for the evolution of the department. The Harvard math department of the 20th century was a microcosm of the broader socio-political reality of the time. The rhetoric that shaped those years—impacting hiring decisions and bringing an underlying sense of anxious uncertainty to the world of academia—echoes still around us in the news.

This look back on the Harvard math department in the 20th century seeks to examine how it reacted to the challenges of those days and how it grew stronger for those challenges, both as a center of academic research and as a community.

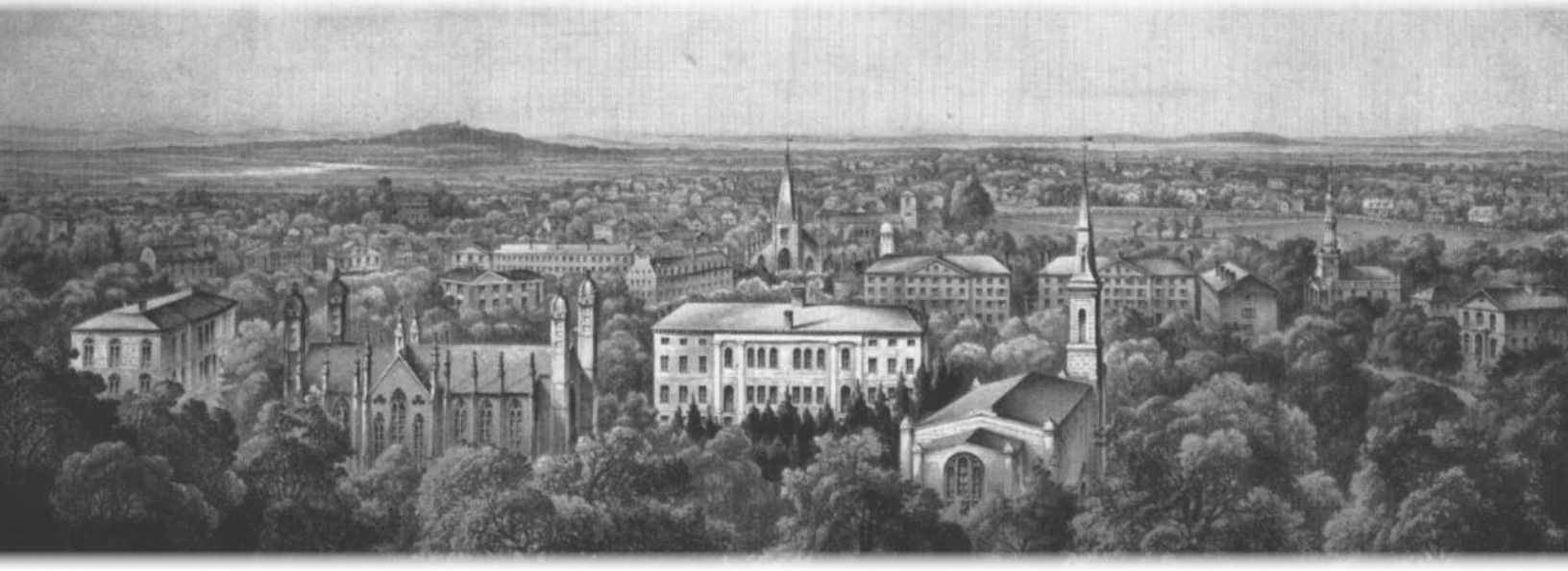
Early Days and the Birth of Original Inquiry

During Harvard's first century, math was mostly taught by minimally trained instructors who held the title of "tutor" and used European textbooks. Some of the earliest historical information available about this time is found in administrative records of the 18th century, where math was largely a functional auxiliary to theology and navigation. The appointment of Isaac Greenwood as the first Hollis Professorship of Mathematicks and Natural Philosophy in 1727 established a formal structure for scientific instruction, though the curriculum remained restricted to arithmetic and geometry. There was no cohesive research mission and the instructional culture was characterized by the reproduction of established knowledge rather than the creation of new research and mathematical frameworks.

It wasn't until the late 19th century that Harvard mathematicians really began to bridge the gap between American instruction and European research. It began with Benjamin Peirce, who entered the college as a freshman in 1825. Historical accounts characterize him as the first American to produce original mathematics of international significance, an ambition that was notably frowned upon by an administration that still viewed professors primarily as teachers. He published "Linear Associative Algebra" in 1870, where he defined mathematics as "the science that draws necessary conclusions." Peirce was described as an "inspirational, if opaque lecturer" – but his brilliance was accompanied by an inability to communicate basic concepts clearly, creating a sense of "awe that amounted almost to dread" among his students. He made contributions to celestial mechanics, statistics, number theory, algebra, and the philosophy of mathematics, but his successors lacked his transformative research drive. It took a pair of German-trained American mathematicians to transform the department into a world-renowned research institution.

At the time, American math students with the means to do so pursued their graduate studies in Göttingen, Germany. Opportunities for course work and thesis direction in the United States were still vastly inferior; between 1890 and 1894, only two American universities granted more than two mathematics Ph.Ds. It wasn't until 1872 that Harvard even established its own graduate school.

Mathematicians William Osgood and Maxime Bôcher also chose to obtain their graduate degrees in Germany. However, they returned to the United States and became Harvard instructors in 1890 and 1891, respectively, working tirelessly to change the institutional culture in the math department. They invigorated the graduate program and shifted the faculty's focus toward scholarly publications. In 1912, Osgood and Bôcher were invited to deliver plenary addresses to the International Congress of Mathematicians in England. Harvard mathematics had arrived on the global stage.



Bird's eye view of Harvard College and Old Cambridge, 1858. Hamilton Vaughan Bail, Views of Harvard, A pictorial Record to 1860.

> The first Harvard Ph.D. was awarded to William Byerly in mathematics in 1873.

Growing Pains

The addition of George David Birkhoff in 1912 to the faculty was perhaps the most significant development for the Harvard math department since the hiring of Osgood and Bôcher just over two decades earlier. Almost immediately upon his arrival, Birkhoff proved Henri Poincaré's last geometric theorem (now known as the Poincaré–Birkhoff theorem) and his research in dynamical systems and the ergodic theorem provided a unifying framework that resonated throughout the 20th century. However, Birkhoff was also surrounded by significant social and ethical controversies as his mathematical brilliance often came in conflict with his personal biases.

The years following his Harvard appointment were defined by a complex tension between rising research ambitions and the geopolitical upheavals of Europe. Up to that point, department faculty were largely drawn from its own alumni. As scholars were fleeing fascist Europe, Birkhoff expressed strong opposition to the hiring of Jewish mathematicians. A combination of academic xenophobia and protectionist hiring policies resulted in the failed appointments of Constantin Carathéodory, a world-renowned mathematician of Greek origin, and Salomon Bochner, a Galizien-born mathematician whose career in Munich was already being hampered. Albert Einstein and Norbert Wiener both provided recollections of Birkhoff's exclusionary practices. Wiener's memoirs described Birkhoff as "intolerant of possible Jewish rivals," believing they possessed an unfair advantage" in their early intellectual maturity.

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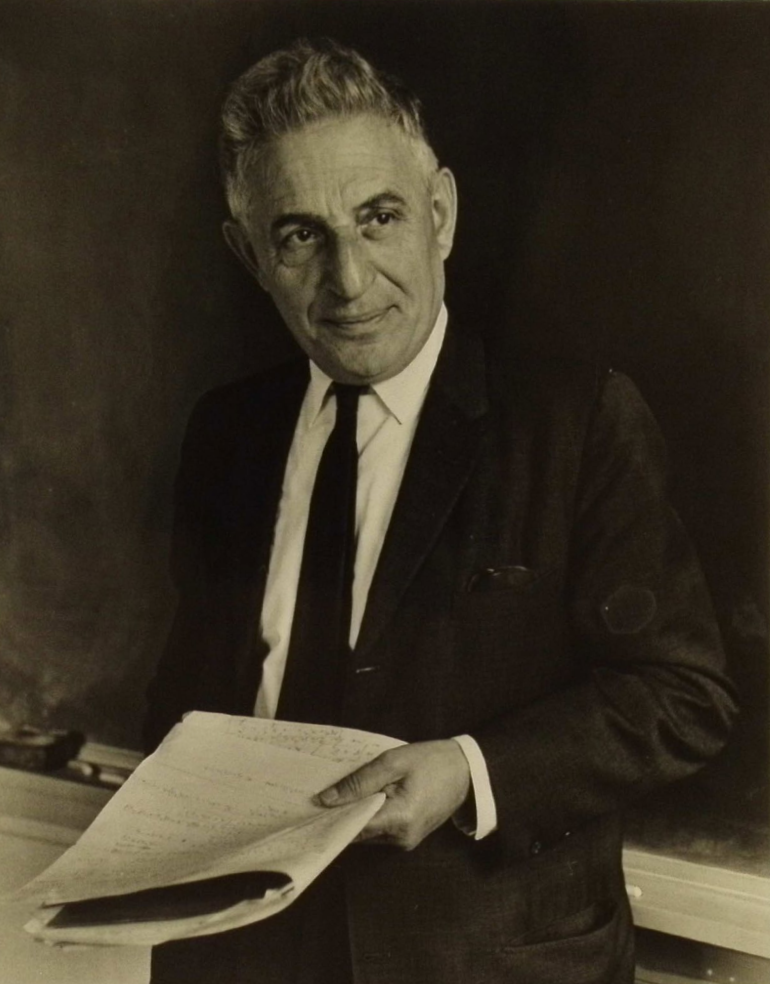
In his 1938 address to the AMS at the celebration of its 50th anniversary, Birkhoff articulated his anxiety—by no means unique to him—as "a sense of increased duty toward our own promising younger American mathematicians." He went on to warn that eminent researchers from abroad were reducing the number of available positions for young Americans, with "the attendant probability that some of them will be forced to become 'hewers of wood and drawers of water'." The influx of European scholars had brought a new urgency to what was already an old debate. Unease about hiring foreign mathematicians reflected not only on the economics of the thirties, but also as an ongoing concern with the survival of democracy.

But even Birkhoff's belief-system occasionally contradicted itself as it clashed with his views of and attitude toward specific individuals. Some European mathematicians found temporary or permanent refuge at Harvard. Stansislaw Ulam, a Polish-Jewish mathematician from the Lviv school, came to the Society of Fellows in the late 1930s as a Junior Fellow. His autobiography, "Adventures of a Mathematician," provides a vivid outsider's perspective of the Harvard math department of that time. In it, Ulam noted the personal paradox of Birkhoff who, despite his anti-Semitic beliefs, invited him to dine at his house, helped him into his overcoat—an older man helping a much younger man was a courtesy unheard of in Poland—and in general seemed to like his "independence and outspoken ways."

Russian Jew Oscar Zariski, one of the most influential algebraic geometers of the 20th century, was received "with great kindness" in the fall of 1940. In "The Unreal Life of Oscar Zariski," he recalled a conversation with Birkhoff over tea. He "greeted me very warmly…He spoke at length about a Spaniard, a student of his who could not find a position, and he said, 'I think that's very bad because he deserves to be appointed and there aren't many Spanish math students in the U.S. and so we shouldn't be afraid of them. There will not be a rush of Spaniards to come over.' With the Jews it was a different story, and Birkhoff was afraid that if you appointed one, there would be a second and a third, and so on, and there probably would be. So that even though he was always kind to me, I knew that he had prejudice." Nevertheless, before Zariski left for Johns Hopkins, Birkhoff allegedly took him aside and told him he would probably be at Harvard in the next five years.

Harvard After WWII

The end of World War II and Birkhoff's death in 1944 catalyzed a rapid shift in the department's cultural and mathematical priorities, and his prediction came true. Oscar Zariski was hired in 1947 as Harvard's first tenured Jewish mathematician. He found a very different department from the one he'd visited during the war. At 48, he was only four years younger than the oldest member of the department. The youth of the faculty and the influx of bright new graduate students minimized rather than dramatized social differences. Long dresses and tuxedos appeared less often at formal dinner parties, "Mr." occasionally replaced "Professor," and Zariski was surprised by a Harvard custom that put him on a first-name basis with other full department



Oscar Zariski, 1988. From the collections of the Harvard University Archives.

members, some of whom he was meeting for the first time.

This gradual tilt toward a more casual atmosphere was in stark contrast with the previously formal nature of social and professional life at Harvard. In the past, a well-known mathematician would be rebuked by his chair for not shining his shoes, and divorce or any hint of "immorality" meant an automatic severing of tenure. Graduate students understood that they stood to forfeit financial aid if they so much as presumed to marry. Lars Ahlfors, a Finnish mathematician and the first Fields Medalist, described the frequent formal dinners from his first appointment at Harvard in the late '30s: "If the invitation didn't say 'informal,' you had to go in tuxedos and long dresses and you were given only ice water to drink until the ladies left the table."

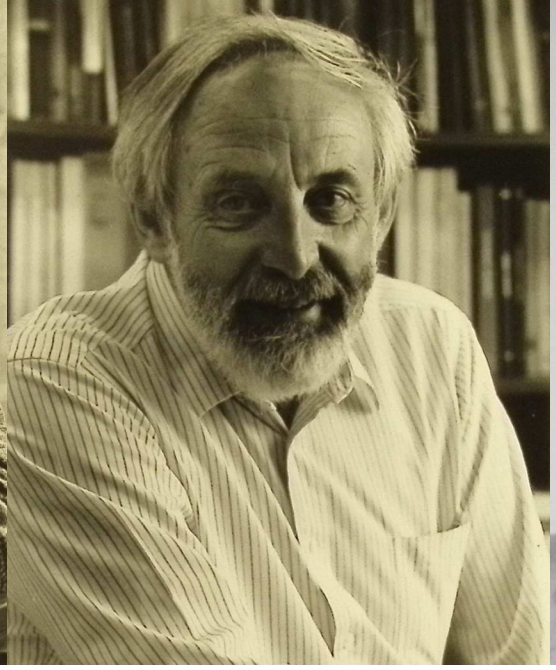
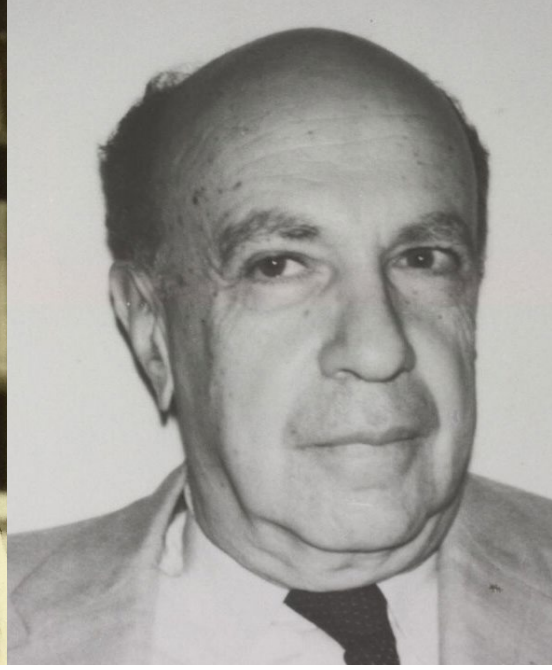
Zariski was quick to capitalize on the opportunity, fanning the flames of change simmering throughout Harvard. He brought with him the classical traditions of the Italian school of algebraic geometry, which he then modernized using the rigorous tools of abstract algebra. He transformed Harvard into an international center for algebraic geometry, attracting luminaries such as Jean-Pierre Serre and Alexander Grothendieck to visit the department in the 1950s.

Other Europeans followed Zariski's appointment, including Richard Brauer, a German Jew who fled Nazi persecution, and Raoul Bott, a Hungarian mathematician who spent 40 years on the Harvard faculty and became a father figure in the department. Zariski had known Brauer from his time at the Institute for Advanced Study in the early 1930s and was

> "Harvard and Boston at the time were still more formal than California. Every faculty member who wanted to hold an exam had to make sure they were free of tuberculosis. We'd get a letter in the mail telling us to go do the doctor and get certified that we were ok. One of my fellow Benjamin Peirce instructors kept putting it off until he got a letter firing him. It was pretty clear he'd get his job back if he just got tested. He did and was reinstated, but he showed me the letter that fired him and the one that reinstated him and they were all signed with something like "Your Humble and Obedient Servants, the President and Fellows of Harvard College." They were ragging on us, signing off in the most subservient yet formal way possible! You'd never get a letter like that in California."
>
> Al Hales, Professor Emeritus of Mathematics at UCLA and former Harvard Benjamin Peirce Instructor (1963-1966).

also taken with Bott's flair and brilliance, convinced the latter was just the man to liven up what seemed to Zariski a still stodgy department. This proved true; Harvard professor *emeritus* and Zariski's former graduate student, David Mumford '61, recalled: "Raoul would come into parties and clap his hands and say, 'Why is everybody whispering? Where am I? At Harvard?'"

Zariski also took great pride in being called "the Italian bandit," a moniker he earned for being agreeable with his colleagues and implacable with the administration. When the College's appointment rules fit what he wanted, he used them; when they didn't, he feigned ignorance. He helped set the stage for the Harvard math department to evolve into something a little more familiar to our modern-day sensibilities. A community was coming together, still holding onto some of the norms and traditions of its past, but always welcoming and always striving to better itself.

From left to right: Lars Ahlfors, Raoul Bott, and Richard Brauer. From the collections of the Harvard University Archives.

A Community Taking Shape

The latter half of the 20th century was defined by a group of faculty often referred to as the "quiet giants" of the department. Andrew Gleason, a Junior Fellow who sidestepped the traditional Ph.D. process due to his extraordinary promise, solved Hilbert's Fifth Problem. His World War II service as a naval codebreaker informed his lifelong commitment to cryptographic security and problem-solving. George Mackey remained at Harvard for his entire academic career. His work on the foundations of quantum mechanics and the "Mackey Machine" for group representation established a rigorous dialogue between physics and mathematics. John Tate, Barry Mazur, David Mumford, Heisuke Hironaka, Shlomo Sternberg, and more rounded out a cast of mathematical superstars. But the department still had a few challenges from its past weighing it down. Among them were the space it occupied, and the way in which women filled that space.

In the first half of the 20th century, Harvard math took up a single floor at 2 Divinity Avenue. It was a fairly small building that Al Hales, a Benjamin Peirce Instructor in the 1960s, described as "definitely not a location for mathematics. It was just too crammed." Even though the department has always been on the smaller side compared to its peer institutions, the tight quarters still chafed. All the teaching faculty shared that single floor, while the graduate students were in an entirely separate building. Many classes were held at Sever Hall. There was also no real designated gathering space other than faculty members' homes, where wives hosted elaborate parties.

Aviva Green followed her husband, Shlomo Sternberg, when he joined the department in 1959. She remembers the parties she helped host. "Everybody was invited," she said. "Math departments from MIT, Brandeis, Northeastern, Boston University, Boston College, they all came. It was about 60–80 people with an enormous spread on the table. There was a lot of food, drink, talk, and camaraderie. It was also a huge amount of work." Green remembers wives Yole Zariski and Ilsa Brauer teaching her how to set a table for 80 people and to this day cherishes the sense of familial connection those times fostered among members of the math department.

In 1973, the Science Center opened its doors and the math department suddenly had more space. The newly constructed common room on the fourth floor of the building became the primary spot where people could socialize.

Melissa Mills served as an administrative assistant and a secretary for the department chair 1977–1984. "When faculty members didn't answer their phones, their calls were forwarded to the department number, 617–495–2170," she said. That number has remained unchanged since Mills' time at Harvard. Mills also maintained the department's equipment which, at that time, consisted of a stamp machine, a mimeograph machine, and a Xerox machine. The position was her first job out of college and was a formative experience that had a profound impact on both her personal and professional life.

"The math department seemed to function as one large extended family that brought together faculty members, staff, visitors, and graduate students from around the world," she said. She regularly witnessed people teaching and learning from one another in a way not bound by traditional hierarchies. Department meetings took place in the chair's office—still located right next to the administrative main office—and faculty members brought their own lunch.

The 1960s and 1970s were also a time that brought about a period of enormous change nationally as women went to work in droves. Green attended the School of the Museum of Fine Arts. She recalls how the great, elaborate parties of her early days in the department became much less common. "I don't think it stopped precipitously," Green said. "But when it did stop, we all noticed it." As women receded from the social side of department life, their lack of presence on the academic side became more apparent. Harvard's first female math Ph.D., Mary Curtis, received her degree

Newly constructed Science Center.

Department gathering in student lounge. From the collections of the Harvard University Archives.

> The well-known tradition of weekly colloquia teas at the math department used to consist of one faculty member's wife baking cookies while another poured tea for the men every Thursday afternoon. When John Tate's wife at the time, Karin, was asked to take part in tea-pouring, she simply let the conversation lapse. The first few weeks without a wife present, the men asked the department secretary to pour. "But little by little," Karin Tate shared, "they learned to pour for themselves."

From left to right: Arthur Jaffe, Deborah Hughes Hallet, Raoul Bott, Barry Mazur, John Tate, Dick Gross, Joseph Bernstein, Michael Rabin, Yum-Tong Siu, Heisuke Hironaka, Cliff Taubes, and Andrew Gleason.

in 1917, but female graduate students in mathematics were still a rarity. Even more rare were female faculty members. Green and Mills remember people making concentrated efforts to recruit female mathematicians.

“Shlomo was quite active in trying to bring more women as faculty,” Green said. “I recall a number of women mathematicians that we would have over for dinner or just for conversation, and it was really hard on them. There weren’t many of them.”

According to Mills, the faculty successfully petitioned for the creation of teaching faculty positions for Deborah Hughes Hallet and Robin Gottlieb. After joining Harvard in the 1970s and 1980s, respectively, they worked tirelessly to advance mathematical pedagogy.

However, neither Hughes Hallet nor Gottlieb were ever full members of the senior faculty. At Harvard, Hughes Hallet reached the position of senior preceptor and is now adjunct professor of public policy at the Kennedy School of Government. Gottlieb was professor of the practice until her retirement, now Professor of the Practice of Mathematics, *Emerita*. Regardless, their impact on the department was deep and lasting. “The efforts they made to modify traditional systems to support undergraduate education are an example of their leadership,” Mills said. “The outcome was evident in the course evaluations.”

The Relentless Pursuit of “Necessary Conclusions”

Andras Szenes arrived from Hungary as a graduate student in 1986. “It was a very friendly place,” he said. “It was a very good, collegial community at the time. People seemed to like each other. It was relatively easy to approach others if you had questions.” Szenes, one of Bott’s last graduate students, remembers being at Harvard when the Berlin wall fell in 1989, resulting in an influx of Eastern European mathematicians. “Even with so few people, the department did a fantastic job absorbing all these cultures and all these people,” he said. “It did so with great patience.” A few of Szenes’ Harvard contemporaries include Edward Frenkel, Nicolai Reshetikhin, and Vladimir Voevodsky, the latter of whom went on to receive the Fields Medal.

Shing-Tung Yau arrived at Harvard in 1987, bringing with him over a dozen new graduate students. His research bridged the gap between abstract geometry and the physical universe. In 2014, he founded the Center of Mathematical Sciences and Applications (CMSA), a multidisciplinary research center and an incubator for two-way interactions between mathematics and other sciences. This represented a modern institutional shift toward interdisciplinary research. Mathematicians suddenly had the space to interact with scientists they might not otherwise have the opportunity to engage.

In 2009, French mathematician Sophie Morel became the first woman tenured in the Department of Mathematics. Lauren Williams joined the senior faculty in 2018, and Melanie Matchett Wood and Laura DeMarco joined in 2020. In their short time at Harvard, Williams and Matchett Wood have each received the MacArthur Fellowship and were elected to the American Academy of Arts and Sciences. Mathcett Wood and DeMarco, the Hollis Professor of Mathematicks and Natural Philosophy, were both elected to the National Academy of Sciences. The number of female concentrators and graduate students has also increased significantly. Six of the nine Ph.D. students graduating in the 2025–2026 academic year are female. Gotlieb’s legacy also endures. In the 40-plus years she spent at Harvard, she developed our department’s preceptor program as an innovative, entrepreneurial group of teaching-focused faculty.

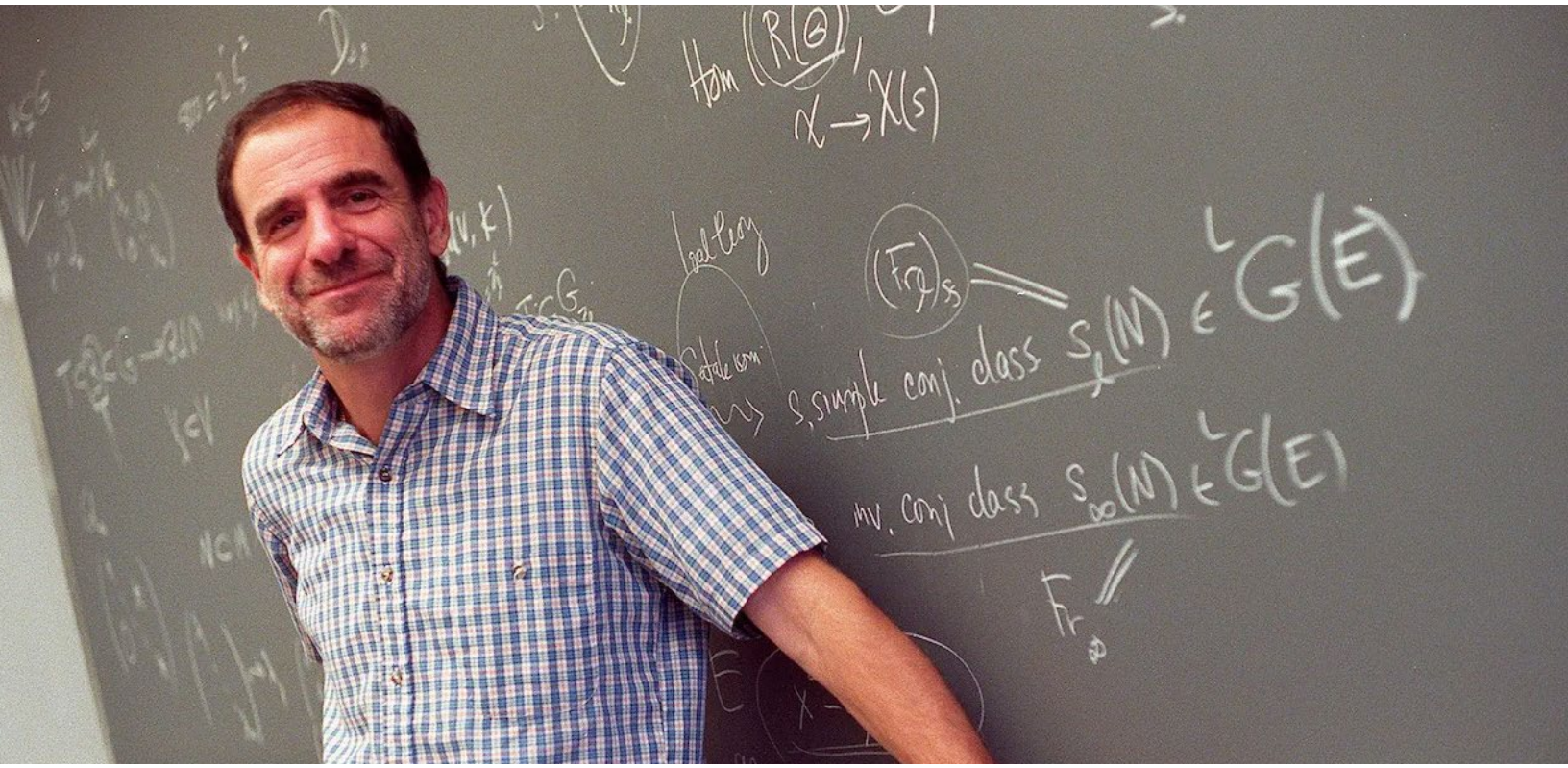
All of these things were made possible by seeds planted decades earlier. By Zariski’s efforts to open up the department to foreign scholars; by creating a new space for a cramped department to spread out academically and socially; by redefining the place of women in the department. One feeding into the other. Peirce defined mathematics as “the science that draws necessary conclusions,” a dynamic, deductive process used to uncover inescapable truths across all fields of inquiry, rather than just a study of numbers. We like to think this fits quite well with the history of the Harvard math department. That history is not perfect, but no history ever is. The Harvard math department narrative is one of human endeavor, institutional evolution, and the relentless pursuit of “necessary conclusions,” however difficult they may be.

Further Reading

A comprehensive list of Harvard Department of Mathematics history resources are available on our website. Items include articles, book chapters, and photos. Below, a list of books that proved highly useful for this article:

- *“A History in Sum: 150 Years of Mathematics at Harvard 1825–1975” by Steve Nadis and Shing-Tung Yau, Harvard University Press*
- *“Adventures of a Mathematician” by Stanislaw Ulam, University of California Press*
- *“Mathematicians Fleeing from Nazi Germany: Individual Fates and Global Impact” by Reinhard Siegmund-Schultze, Princeton University Press*
- *“The Unreal Life of Oscar Zariski” by Carol Parikh, Springer Publishing Company*

In Memory Of Benedict “Dick” Gross



Professor *Emeritus* Benedict Gross passed away in December, 2025. Gross joined the Harvard Department of Mathematics as an undergraduate in the ’60s and taught here until 2015. His academic career was long and storied, and no one embodied the math department—or the university as a whole—more than him.

Gross’ contributions to number theory, algebraic geometry, modular forms, and group representations earned him a MacArthur Fellowship in 1986. In 1987, he received the Cole Prize of the American Mathematical Society alongside Don Zagier and Dorian M. Goldfeld for their work formulating and proving the Gross-Zagier formula, which relates the height of Heegner points with the central derivatives of the zeta function of the corresponding elliptical curves. Gross was a fellow of the American Mathematical Society and the American Academy of Arts and Sciences, as well as a member of the National Academy of Sciences and the American Philosophical Society. But for all his accomplishments and contributions, he was a perfect example of how a career in mathematics is not always a straightforward journey.

We collected stories, anecdotes, and recollections about Gross’ impact on the lives of his friends, colleagues, and former students. The contributions were so numerous, we would have needed a whole separate newsletter to contain them all.

Read them here, and thanks to everyone who contributed:

www.math.harvard.edu/in-memory-of-professor-emeritus-benedict-gross

In Memory Of Heisuke Hironaka

Professor *Emeritus* Heisuke Hironaka passed away in March, 2026 at the age of 94. He received his PhD from Harvard in 1960 under the direction of Oscar Zariski and, after holding positions at Brandeis and Columbia universities, joined the Harvard faculty in 1968.

Hironaka was a fellow graduate student and, later, a colleague of Harvard Professor *Emeritus* David Mumford. “Three of us were Oscar’s students around 1960—Michael Artin, Heisuke Hiironaka and me. It was an exciting time with so many new ideas flooding in,” Mumford said of their student days. “We were comrades setting out in multiple directions: Hei (the name he went by socially) on singularities, me on moduli, and Mike on étale cohomology. Perhaps Hei was closest to Oscar because he picked up so amazingly and successfully on the resolution of singularities, a problem close to Oscar’s heart.”

Hironaka was one of the premier algebraic geometers of the 20th century. He was best known for his 1964 work on the resolution of certain singularities and torus embeddings with implications in the theory of analytic functions, and complex and Kähler manifolds. For this work, Hironaka was awarded the Fields Medal in 1970. He is one of the most widely known and acclaimed scholars in Japan, where he has had a broad influence on society and education. In 1975, he was awarded the Order of Culture of the Japanese government by the Emperor.

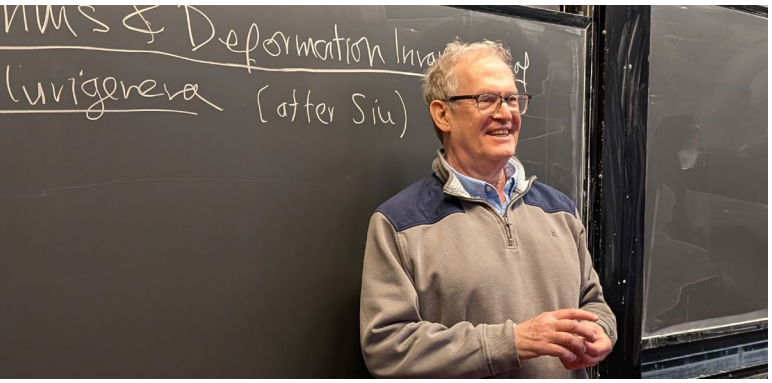
While at Harvard, Hironaka held a joint professorship at Kyoto University. He went on to become director of the Research Institute for Mathematical Sciences in Kyoto (1983–1985) and president of Yamaguchi University (1996–2002). Hironaka contributed a lot of time and effort to encouraging young people interested in mathematics. In 1980, he started a summer seminar for Japanese high school students and later added one for Japanese and American college students. In 1984, he established a philanthropic foundation called the Japan Association for Mathematical Sciences, which provides fellowships for Japanese students to pursue doctoral studies abroad. He also played an important role in founding the international Kyoto Prize which, since 1984, has been awarded annually in advanced technology, basic sciences, arts, and philosophy.

In 2011, Hironaka was awarded the Harvard Kenneth C. Griffin Graduate School of Arts and Sciences (GSAS) Centennial Medal. It is the highest honor that the Harvard Griffin GSAS bestows to celebrate the achievements of a select group of Harvard University’s most accomplished alumni whose contributions to knowledge, to their disciplines, to their colleagues, and to society at large have made a fundamental and lasting impact.

When asked “Why do you do mathematics?” in a 2005 interview he gave for the “Notices of the AMS,” Hironaka’s response was: “I accumulate anything to do with numbers. For instance, I have more than 10,000 photos of flowers and leaves. I like to just count the numbers and compare them. I am so pleased to be a mathematician, because I can see the mathematical interest in things.”

Spring 2026 Benedict H. Gross Distinguished Visitor

Robert Lazarsfeld



Robert Lazarsfeld was no stranger to the Department of Mathematics when he accepted the position of Benedict H. Gross Distinguished Visitor. Not only was he a Harvard undergraduate student (class of 1975), he also served as a Benjamin Peirce (BP) Instructor from 1980 until 1983. “When I was an undergraduate, all the people whose pictures are in this office were active faculty members,” Lazarsfeld said, referring to the photos and portraits lining the walls of the office he occupied during his time as the Gross Distinguished Visitor. “When I was a BP, David Mumford, Phillip Griffiths, and Heisuke Hironaka were here. This was the center of algebraic geometry, which is what I do.”

Lazarsfeld has had a long and distinguished career since his Harvard days. After receiving his graduate degree from Brown University in 1980, he went on to hold faculty positions at UCLA, the University of Michigan, and Stony Brook University. Known as a top world expert in algebraic geometry, he is also an elected Fellow of the American Academy of Arts and Sciences and a fellow of the American Mathematical Society. Lazarsfeld has received a number of honors and awards over the years, including the 2015 AMS Leroy P. Steele Prize for Mathematical Exposition for his two-volume work “Positivity in Algebraic Geometry I and II.” The prize citation described his books as “instant classics” that have profoundly influenced and shaped research in algebraic geometry and that can be used for courses and seminars all over the world.

As the Gross Distinguished Visitor, Lazarsfeld regularly met with the current crop of graduate students and gave a series of five lectures on a topic in higher dimensional birational geometry, namely multiplier ideals and applications. He also made it his mission to talk about algebraic geometry with as many people as possible. Some of those people included Harvard Professor of Mathematics Mihnea Popa and Benjamin Peirce Fellow Nathan Chen. Both are former graduate students of Lazarsfeld’s, and Popa was the one who recommended him for the position.

“It has been wonderful having Rob around the department,” Chen said. “We have discussed math and explored new questions nearly every week.” Chen frequently finds himself amazed at Lazarsfeld’s intuition when it comes to algebraic geometry and at his ability to recall decades-old conversations, ideas, and calculations. On a more personal note, Chen views Lazarsfeld’s mentorship as an indelible influence on his growth as a mathematician.

Popa described Lazarsfeld as “a clear and inspiring expositor who is very encouraging to young researchers.” He believes that the math department should always strive for these qualities when it considers candidates for a prestigious position like the Gross Distinguished Visitor. “He has met with many of our students and had very good research advice for them,” Popa said. Quite a few of them were, in fact, Popa’s own students. “It’s been really great for our young people to have such a role model around for an extended period of time.”

Lazarsfeld is currently in the process of retiring from Stony Brook University. But while he and his wife have already moved to Philadelphia, he’s by no means stepping away from mathematics. As he put it, he’s “not going to be playing golf” just because he’s retiring; he already has an office waiting for him at the University of Pennsylvania math department.

“I’ve been interested in questions about what I call “birational complexity,”” Lazarsfeld said of his most recent research interests. “In algebraic geometry, there’s a notion of when two algebraic varieties aren’t exactly the same but birationally equivalent, meaning almost the same. I’m working on a set of questions such as how do you measure how complicated a variety is and when are two varieties equally complicated. That’s what I’ve been talking to people about for the past few years.”

The Benedict H. Gross Distinguished Visitor program was launched in 2025 thanks to a gift from William R. Hearst III ‘72, a former math concentrator who named it in honor of his old classmate Benedict “Dick” Gross. Each year, the department invites a prominent mathematician from another institution to teach, give lectures, and engage with students and faculty for at least a month and up to a full semester. The visiting scholars are selected by the department chair and alternate between world-renowned senior scholars and highly promising junior ones. The first Gross Distinguished Visitor was Peter Sarnak, a professor of mathematics at Princeton University and the Institute for Advanced Study. The next visitor, expected in the Fall of 2026, is slated to be Daniel Litt, an assistant professor of mathematics at the University of Toronto.

Janet Chen
Senior Preceptor

Janet Chen has been a part of our department since her graduate school days. After graduating from Harvard with a math Ph.D. in 2006, she became a preceptor. She was appointed as a senior preceptor in 2011. Chen was awarded the 2025 Anya Bernstein Bassett Award for Excellence in Teaching by the Harvard Office of Undergraduate Education for her focus and dedication to implementing evidence-based teaching practices, an orientation toward pedagogical innovation, and an exemplary alignment with department curricular goals.

Discovering Mathematics

Chen's love for mathematical education goes all the way back to her own experiences as a student. It was her teachers in junior high and high school who noticed she wasn't sufficiently stimulated in her math classes. They gave her more challenging problems to solve, pulled her into the school's math team, and introduced her to competition math. Chen got her first experience with proof-based math at a summer math camp. "That was really eye-opening and a lot of fun," she said. "That's when I started to think that maybe I'd want to study math in college."

She double-majored in mathematics and computer science as an undergraduate at Stanford—her parents had wanted her to be an engineer—but quickly realized that it was her math classes that really made her think. Chen came to Harvard determined to pursue mathematics. This was also when she discovered that she found teaching much more rewarding than research. "That's when I shifted my focus to teaching," Chen said. She recalled that her high school would not only participate in, but also host competitions. "We were writing problems for other people to solve and I really enjoyed that," she said. "In teaching, I often felt like if I could write the right problem, that would help students see the idea for themselves rather than me having to tell them how things work."

A lot of Chen's teaching has come to revolve around how to write problems that would push students to organically discover the ideas she discusses in her classes. Her hope is that if they experience their mathematical education in this way, they will take ownership of those ideas as opposed to viewing them as just another set of rules to memorize.

About Harvard

Chen chose Harvard for her graduate studies on the advice of her Stanford professors. While she didn't understand what they meant at the time, they told her she should explore the different ways math could be taught across various institutions. Chen stayed to teach at Harvard, drawn by the quality of students, the emphasis on mathematical pedagogy, and the small class sizes. "My mom taught math at a college for a while and she taught 300-person lectures where she'd only know one or two students," Chen recalled. "I just don't think that's a good way to learn math. The fact that we can teach in small classes means that we get the chance to react in real time, adapt to the ways in which students think, and build their understanding of the material."

She has worked with the department's introductory math team on curriculum development, written lesson plans and worksheets for her fellow instructors to use, redesigned practice exams to better align with course objectives, and more. But if you asked her what her favorite class to teach is, she'd have a hard time choosing. That's because she remembers students more than a specific class. "Some semesters you have groups of students that are especially engaged or really want to come to office hours and talk," Chen said. "Sometimes they want to learn more math, sometimes they just want to talk about what it's like to be a student and what the best ways are to approach their studies. Those semesters are always fun."

Outside Mathematics

In her free time, Chen loves reading and traveling. Her latest favorite book combines those two passions. Presented as a memoir of a fictional Japanese writer, Taiwan Travelogue tells the story of the writer's year in Taiwan, then a Japanese colonial island in 1938. "It's about colonialism, but also about travel," Chen said. "It also has really good descriptions of Taiwanese food." The book has inspired her to go hiking in Taiwan in the near future.

Thomas Brazelton

Postdoctoral Fellow

Thomas Brazelton joined the Harvard math department as an NSF Postdoctoral Research Fellow in 2023, after receiving his Ph.D. in mathematics from the University of Pennsylvania. His focus on teaching has earned him a number of fellowships and awards. Brazelton is also a two-time recipient of the AIM Structured Quartet Research Ensembles (SQuaREs) grant. Starting in Spring 2027, he will be an assistant professor at Vanderbilt University.

Discovering Mathematics

When he thinks back to when math first became "this incredibly exciting thing," Brazelton recalls his high school calculus teacher. "I remember the day we did the Fundamental Theorem of Calculus over two days," he said. "When he hit the punchline, it felt like this huge cliffhanger in a TV show; this massive, exciting moment when I thought, that's so cool!" However, Brazelton didn't fully commit to math until halfway through his undergraduate studies at Johns Hopkins University. He was originally on the international studies track but found himself taking math class after math class for the sheer fun of it. "At some point, I thought, why am I even doing anything else?" he said. "Why don't I just take math?"

Brazelton took what he described as a "mindblowing" analytic number theory class before eventually finding algebraic topology. This is where his focus mostly lies these days. He found the questions interesting and the process of extracting algebraic data out of topological spaces fascinating.

Over the years, he also picked up motivic homotopy theory (a way to apply the techniques of algebraic topology, specifically homotopy, to algebraic varieties) and enumerative geometry (the art and science of counting geometric objects satisfying geometric conditions). Brazelton was so enamored with the latter that he coauthored a paper outlining its history titled "The Evolution of Enumerative Geometry: A Narrative from Classical Problems to Enriched Invariants."

"It's this classical, beautiful geometry that started in ancient Greece and became really popular in France around the 19th century," he said. "I like to do more modern things with it." Recently, his focus has been on equivariant enumerative geometry, studying situations in which there is ambient symmetry and how that's reflected in the solutions.

About Harvard

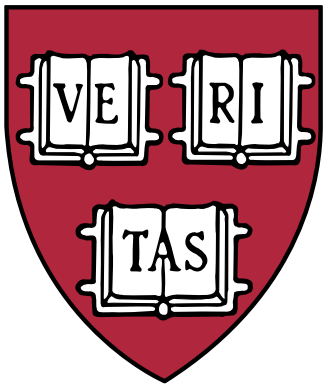
Although Brazelton came to Harvard to work with George Putnam Professor of Pure and Applied Mathematics Mike Hopkins, he found speaking with Higgins Professor of Mathematics and Department Chair Joe Harris just as rewarding. "I got into algebraic topology but now I mostly do things that are on the interface of enumerative geometry," Brazelton said. "Joe is one of the big leaders in that field. Getting the chance to talk to him has been fantastic."

Teaching has been another big part of his academic experience. As a postdoctoral fellow, he has been a teaching assistant for MIT's Educational Justice Initiative, showing people incarcerated in and around Massachusetts how to code. At Harvard, he has taught two introductory math classes (on calculus and on sets, groups, and geometry) and two graduate topics courses (on unstable motivic homotopy theory and on advanced algebraic topology). Brazelton has found the experiences wildly different but equally rewarding. While the graduate classes allowed him to cover his topics of choice and learn a lot of "very cool math" to teach them, the introductory classes centered his attention less on content and more on pedagogy. "I could focus on designing a really good curriculum, and on getting students engaged and motivated in class," he said.

Outside Mathematics

Brazelton's teaching doesn't end at math; in his free time, he's a swing dance instructor in Boston. He's also a hyperpop DJ and a gamer. He's been playing a tremendous amount of RimWorld recently, a construction and management simulation game.

Message From the Director of Undergraduate Studies



Cliff Taubes
William Petschek Professor of Mathematics
Director of Undergraduate Studies

Greetings,

Spring is here and summer's coming; the north wind walking the brittle snow, long and evil these past dark months* is a fading memory now. So I wish you all the best of luck for the summer and onward; especially best wishes to the people leaving us in May. I thank you all for being a part of Mathematics at Harvard. For those leaving and for those returning: If you want to read some beautifully written expositions of elegant mathematics this coming summer, you can't do better than to peruse the senior theses that our fourth year people have produced this past year. I hope most of them will be available as PDF documents on the senior thesis website:

www.math.harvard.edu/undergraduate/online-senior-thesis/

What follows is a list of the thesis titles and authors:

- *Crossing the Cut: Approximation on Multiple Riemann Sheets* by Adelina Andrei
- *On Knot Theory and Protein Folding* by Zachary Buller
- *Large Cardinals, Left-Distributivity, and Laver Tables* by Preston Bushnell
- *HoTT To Go: An Introduction to Homotopy Type Theory* by Peter Chon
- *Adelic Zeta Functions and the Density of Discriminants of Cubic Extensions* by Tanav Choudhary
- *Sampling Schedules and Convergence: A Theoretical Framework for Diffusion Models* by Kevin Cong
- *Counting with Theta Characteristics Theta Characteristics on Algebraic Curves as a Tool for Solving Geometric Problems* by David Ettel
- *Verification of OpenDP Transformations* by Amy Feng
- *From Here to There: Transport Entropy Inequalities* by Emma Finn
- *On Local Theory for Classical Bifurcations: Necessary and Sufficient Conditions for Bifurcation of Equilibria* by Willa Fogelson
- *Independence of the Continuum Hypothesis for the Working Mathematician: A Topos-Theoretic Perspective* by Grayson Kemplin
- *Collusion in Auctions* by Jinho Park
- *Social Mathematicians Love the Seifert-van Kampen Theorem* by Josh Rooney
- *Ribbon Concordance is a Partial Order* by Daniel Salkinder
- *Polynomial Dynamics: Escape Rate, Entropy, and Equidistribution* by Ilaria Seidel
- *Dropouts Have Low Degrees: Using Fourier Spectra to Understand Superposition in Small Boolean Networks* by Zoe Shleifer
- *Eigenvalue Multiplicities In Abelian Cayley Graphs* by Easton Singer
- *All Those Moments Will Be Lost: Two Paths to Edge Universality of Random Matrices* by Matthew Tan
- *T-Duality and the Amplituhedron* by Katherine Tung
- *Geometer Ballads and Weyl Songs: Tales of Hyperbolic Reflection Groups* by Charles Wohlgemuth
- *Some Applications of Characteristic Classes in the Mathematical Sciences* by Greg Wong
- *Quadrilateral Folding and Elliptic Curves* by Gil'i Zaid
- *Well-Posedness of Singular Stochastic Partial Differential Equations* by Colin Zou

Aside from wishing you all the best of luck, I want to thank you for making this year a most pleasant year as the Math Director of Undergraduate Studies. Starting in July, I will relinquish that role to Laura DeMarco (Hollis Professor of Mathematicks and Natural Philosophy). Please be kind to Prof. DeMarco; and, as always, to Wes Cain (Assistant DUS), Oliver Knill, and Cindy Jimenez.

Cliff Taubes

**With apologies to Gordon Bok*

Adelina Andrei

‘26, Mathematics, Statistics | Friends Prize Recipient

When and how did you discover your love for mathematics?

When I was little, I spent a lot of time in the countryside with my grandparents. They are not mathematicians; I don’t think my grandfather even went to high school. But sometimes, while taking a break from working in the garden, he would play games with me. He would put together two piles of stones and each of us would take a certain number of stones out of our respective pile. Whoever took the last stone, lost. I now recognize this as a combinatorics problem. He didn’t use that kind of mathematical language at the time, and neither did I. But years later, I stumbled across books with the same kinds of puzzles. They had a language to describe them, packaged into definitions, theorems, and proofs.

Yet there was still the same feeling I had with my grandparents in the countryside when I was trying to discover new tricks to win our games. That’s what pulled me into math, and that was what math meant to me back then. It was all about the feeling. The language describing it was beside the point.

What brought you to Harvard?

I wasn’t sure if math was something I wanted to do, so I wanted to be somewhere I wouldn’t have to commit to a field before I’d even arrived. At the same time, I just really liked thinking about math puzzles. So much so that it still feels surreal to say that’s how I ended up finding and then doing math competitions, nationally and then internationally. It was those competitions that introduced me to people from all over the world and made me realize I wanted to be in a mathematical environment at university.

This is how I ended up applying for college in the U.S. The American system gave me everything I wanted. As for Harvard specifically, in a way it was professors Melanie Matchett Wood and Laura DeMarco who influenced my decision. I remembered reading about Professor Matchett Wood, who had come through competition mathematics before becoming a mathematician, and about Professor DeMarco, who had studied physics as an undergraduate before finding her way to math in graduate school. Their paths to math were, in some sense, opposite to each other. I saw myself in both of them because math competitions were the world I was coming from, but I also genuinely didn’t know if math was where I would end up. I remember thinking that a department open to both kinds of people sounded like a very welcoming place to be. And this all happened before I’d even talked to anyone from Harvard!

How did math become your concentration?

Taking Math 55 was disorienting in a way I hadn’t expected. It wasn’t that the problems were generally harder than those in math competitions I’d done in the past. It was that what I thought math was about, changed. The feeling of discovering tricks that I had carried over from my grandparents’ garden when I was little and the books I read when I was older; none of that seemed to be what Math 55 was about. It was abstractions that came with so much unfamiliar language. There were a lot of new concepts that I had to take my time understanding before I could successfully use.

I didn’t know anymore if math was a feeling or a language. This seems almost silly to me now, because the answer is so clearly an “and,” not an “or.” Looking back, I should have just asked someone for help parsing my thoughts. I didn’t do it, probably because being alone in a new place that I was trying to understand made me afraid that asking for help would lead to someone finding out what I was afraid of and that I wasn’t actually fit to be a mathematician. Instead, I stepped back. I took classes in almost every other subject while still taking some math, trying to figure out what I actually wanted. Yet math was always there in terms of how I thought about my work. In a government class, I ended up turning a political question into one about game theory, working through some math to find an equilibrium.

In a way, all this helped me see that it wasn’t the tricks or the language I was attracted to. It was the way of thinking, which combined both. What confirmed this was a random talk I had with Professor Kisin during his office hours. He was telling me about his experiences and how research feels like a combination of tricks and abstractions. You have to pay the price of learning a lot of math over a long period of time, and the reward is that you get to do what you did in the olympiads but with much more

powerful tools. This cemented my decision to return to mathematics.

How did you grow as a mathematician while at Harvard and where do you see yourself in the future?

Some of it is that I see mathematics differently these days. I once saw it as simply a collection of pretty tricks. Now I see it as that in addition to the abstractions that often pull together ideas across different areas of mathematics. I've come to appreciate math in a different way.

Tell me about your senior thesis, "Crossing the Cut: Approximation on Multiple Riemann Sheets."

It's inspired by thinking about math but it also has real world applications. Often, you can't work with a function directly because it's too hard and it takes too long to evaluate. So you build an approximation, which is supposed to be accurate and fast. The problem is that the best approximations are designed for functions that behave simply. You have one input and one output. But many important functions don't behave that way. They're multi-valued. You have one input and many outputs. For example, imagine a circular parking garage where driving a loop brings you to a different floor, even though you're above the same point of the ground. My thesis asks whether you can build an approximation that works simultaneously across multiple floors from data sampled on only one. I introduced two algorithms that do this.

What does the Friends Prize and the talk you will give as part of receiving it mean to you?

I didn't even realize it was a prize when Professor Taubes emailed me! I was just told I was going to give a talk, then I ran into Professor DeMarco and she said congratulations. I was confused until she told me it's not just a talk, it's a prize! It feels very nice to be chosen to give a math talk in front of other people. Somehow, this feels more meaningful than the prize itself.

What are your plans for the future?

I'm planning to apply to graduate school next year. In the meantime, I'm going to work at an AI lab in San Francisco. I don't know if I'll become a professor, but I do know that I want to continue learning more math.

Jinho Park

'26, Mathematics, English Friends Prize Recipient

When and how did you discover your love for mathematics?

I grew up in the quiet, academic town of Ithaca, New York, which is home to Cornell University. Being from Ithaca, some of my friends' parents were professors in math or other subjects and had a very active interest in teaching young kids math. They would come in and host these math clubs in schools. For me, that was how it started. Once I was in middle school, I started to participate in some math competitions and later in high school I took math courses at Cornell.

Eventually, math became a hobby. What I loved about it was how it allowed me to formalize what felt intuitive. Through math, I felt I was able to observe something real and then put it down in simple and precise terms. It became more fun when I started to accumulate a lot of these terms and see how they interact.

What brought you to Harvard?

When I was applying here, I remember I didn't really expect to get in. But once I did, I felt there wasn't really any other decision that could have been made. I knew I wanted to be somewhere with a liberal arts education, somewhere where I'd be able to explore many interests. I loved math in high school, but I also loved literature. It's been much the same in college. I've retained many old interests but I've picked up new ones. I love economics. I've also been drawn to problems in computer science and statistics. I see my mathematical interest as a way in which I can give precise definitions and theorems to things I see in other fields.

In this way, I think coming to Harvard opened me up to a whole host of other options. I was brought into the school mostly by accident, and coming here has let me see a much larger world.

How did math become your concentration?

I've known for most of my time in college that the questions I was most interested in were outside of mathematics. But I found that the math department was the place where I felt most at home. I loved my first couple years in the department so much—I came in excited to take Math 55 and ended up loving it—that I thought it would be a natural home for the rest of college. Thankfully, the structure of the concentration allowed me to explore other fields. If I had declared something like computer science, statistics, or economics, I would have been much more pinned down to that one area.

I have also found that strong foundations in math have been helpful in every other field I've been interested in. Having strong mathematical foundations has made it much easier to start thinking about larger theoretical structures in many other of my interests. In this sense, one way I would describe my relationship with math is that it has made me more confident in my ability to get through the technical steps. Learning math is like building yourself a safe home.

How did you grow as a mathematician while at Harvard and where do you see yourself in the future?

My first few years at college were entirely consumed with thinking about how I could build my skills and become a more rigorous, precise mathematician. I was always worried that I wasn't grasping the concepts well enough. The question was always, do I have the skills to even attempt some of these classes I'm taking, am I up to par? These days, I spend much more of my time thinking about what questions I want to answer. I often ask myself what questions truly interest me. Solving them is important too, but that part scares me less. Now I feel confident that once I identify the right question, I can take a real stab at it.

As for where I see myself in the future—fundamentally I see myself as someone who looks at the world and thinks of simple mathematical ways to describe it. If I find myself spending my days doing this, I think I will be very happy.

Tell me about your senior thesis, "Collusion in Auctions."

I like to describe it in two ways: first the core question, then how it fits into the existing literature.

The core question is about a fundamental problem in auctions: what happens when bidders show up having already agreed to work together? When people collude, the seller loses. They're trying to get as much revenue as possible from whatever they're selling, but a coordinated group of bidders can suppress competition and drive the price far below what it would otherwise be.

That's the problem. The existing literature offers a beautiful set of game theory tools for studying auctions, but those tools rest on an important assumption: symmetry. Symmetric models treat bidders as identical ex ante. Collusion breaks this, because a cartel often collects many individual bidders together. So collusion is really a story about asymmetry.

My thesis then asks: given the asymmetries that collusion creates, which auction formats hold up best for the seller? Answering this question precisely is where the math comes in.

What does the Friends Prize and the talk you will give as part of receiving it mean to you?

It's a real honor. I've worked on the research for my thesis for more than a year now, so having the opportunity to present my work to a wide audience is very exciting. It is especially a privilege to be able to present it to the faculty, whom I admire greatly.

It also felt meaningful personally. So much of my time at Harvard has been about loving mathematics but feeling pulled toward questions that live outside of it. For a long time those two things felt in tension. But the math department has always been my home here, and part of the reason is that the department makes ample room for students' interests. It's common that people come, love math deeply, and then relentlessly use it on the problems that excite them. In this sense, receiving this prize felt like a gift from a place that has given me a great deal already.

What are your plans for the future?

I plan to work in industry and then go to graduate school.

Message From the Director of Graduate Studies

Melanie Matchett Wood

William Caspar Graustein Professor of Mathematics

Director of Graduate Studies

Dear Friends,

Our graduate program currently supports a community of 58 students united by a shared passion for mathematical scholarship. This year's cohort includes 27 international students from 11 countries around the globe. We were thrilled to welcome 12 new students into our community in Fall 2025, and we are preparing to celebrate the achievements of the 9 students graduating this year. As these graduates move on to postgraduate academic and research positions, they remain a vital part of our enduring network of mathematical inquiry.

Professional development is an important part of our graduate program, bridging the gap between proving theorems and the practical nuances of a long-term career in mathematics research. To support this transition, a new series of conversations led by faculty and postdocs provides a candid look into the "hidden curriculum" of academia, beginning with the mechanics of finding collaborators and managing the interpersonal dynamics of joint projects. Further sessions focused on sharing your work by mastering informal and formal communication, and navigating the journal submission process from an editor's view. The series also tackled modern shifts, including generative AI in mathematics and the deep connections between physics and math. These professional development conversations were supported by the Dean's Fund for Graduate Program Initiatives (DFGPI) through the Harvard Kenneth C. Griffin Graduate School of Arts and Sciences.

Philanthropic support is a key part of funding our graduate program. In particular, the Putnam family has been a long-time supporter of the department and generously provides for the graduate program every year. Over the past year, this support has provided critical funding for 32 graduate students. In addition to institutional aid from Harvard University and the Department of Mathematics, graduate student research is supported by the National Science Foundation (NSF) Graduate Research Fellowship Program, the Ezoe Memorial Recruit Foundation, the Simons Foundation, and Citadel Global Quantitative Strategies (GQS).

Recently, we faced an unprecedented funding challenge with a 50% cut from the Harvard Faculty of Arts and Sciences (FAS) in their support for graduate students admitted for Fall 2026. In response to this challenge, some of the Friends of the Mathematics Department reached out with incredible generosity and support, funding several additional graduate student positions for the Fall 2026 incoming class. This will allow us to admit a close-to-normal-sized class in Fall 2026. The department is extremely grateful for this financial support, and we look forward to bringing another class of amazingly talented and inspiring graduate students to join our community this fall.

Warm regards,

Melanie Matchett Wood

Graduate Student Spotlight

Alice Lin

Alice Lin is a '26 graduate of the Harvard University Department of Mathematics doctoral program. In the Fall of 2026, Lin will assume a postdoctoral position at Northwestern, followed by a three-year postdoctoral position at UC Berkeley.

While math had always come easily to her, it wasn't really something Alice Lin found particularly interesting in middle and high school. Not until she attended Canada/USA Mathcamp the summer before her senior year. "I didn't realize what math research and advanced math were really about," she said. "It seemed a lot more fun and whimsical than what I'd seen in math classes in high school. Less about memorizing rote processes and more about playing around with things and seeing where the logic takes you if you try to pursue a line of thought. That really opened my eyes."

As an undergraduate student at Princeton University, Lin took some introductory proof-based math classes alongside physics and computer science courses. She was also part of a lab doing work in theoretical ecology, where she attempted to simulate population dynamics and make qualitative interpretations about the model. However, Lin quickly grew frustrated with how much choice was involved in setting up the model and selecting the parameters. "It was supposed to model real-world population changes but it didn't feel like I was ever going to be sure this was accurate," she said. At the same time, she was taking more and more math classes. "I liked how solid the foundation of doing pure math felt in comparison to the simulations I was running. Once you prove something is true mathematically, it's really true, no matter what kind of situation you apply it to. I feel like pure math is fun and vigorous, but somehow more permanent at the same time."

After completing a summer program in number theory, Lin had found her mathematical area of interest. She received her A.B. in mathematics from Princeton in 2020 and completed a Masters of Advanced Study in pure mathematics at the University of Cambridge in 2021. She chose Harvard for her graduate studies mainly for the chance to work with Perkins Professor of Mathematics Mark Kisin, who had taught Lin's undergraduate adviser, Yunqing Tang. "She was telling me that he was a great advisor," Lin said. "And I heard the same thing from his current students when I came to visit Harvard at the open house." She also liked the comparatively smaller size of the Harvard math department. Everyone seemed friendly and the department setup made it easy to socialize with people. Mathematically, however, Lin was a blank slate. Her research interests didn't really come together until after she got to Harvard.

In the beginning, she had no idea what Kisin actually worked on other than the fact that it was generally related to number theory. The questions to which she was drawn were largely shaped by the subfield in which her undergraduate adviser worked, leaning toward number theory and arithmetic geometry. Her years at Harvard helped her discover the kind of mathematician she is.

"There are people who build deeper theories, and people who try to use that new theory and apply it to more concrete problems," Lin said. "It's always good to have a balance of these two different types of math research, but I definitely see myself more as the latter. I think it's nice when there are research questions that are fairly simple to state, or you're working with fairly concrete objects and you want to answer a natural question about them. How many natural points does this have? Is there some way to characterize them? What do they look like?"

A version of Lin's dissertation—the culmination of her

Lin at the Garden of Constants art installation just outside Ohio State University's Dreese Laboratory.

graduate studies—is currently available on arXiv and is titled "Finiteness of Heights in Isogeny Classes of motives with Semistable Reduction." It is inspired by one of Kisin's own papers, which considered heights in isogeny classes of abelian varieties, a special class of motive. Kisin suggested Lin generalize this result to motives in general, rather than just abelian varieties. "He's really good at choosing topics that pertain to your past interests," she said. "He thinks a lot about what problems to assign to which students."

Lin also deeply admires Kisin's optimism when it comes to research mathematics. In her opinion, it's what allows him to see the bigger picture; the inherent logic of how mathematical objects fit together and behave, and that nothing is impossible to prove as long as you push through. Kisin encourages his students to ask "If a proof exists, how would it be proven?" and work backwards to fill in the gaps. Lin believes this optimism is a quality that all experienced mathematicians have in common and that she is still working to develop. It helped her to keep going in moments when she felt stuck.

Teaching was another thing that helped her get through research bottlenecks. Over the course of her time at Harvard, she graded for a graduate level course (Math 232a, Introduction to Algebraic Geometry I") and taught two undergraduate level courses (Math 21b, "Linear Algebra and Differential Equations" and Math 1b, "Integration, Series, and Differential Equations"). Lin found the experience a lot of fun, and her students' positive energy contagious. Most importantly, it let her see immediate and concrete results. While research sometimes required a lot of time and energy for very little progress, teaching paid off quickly with just a little bit of effort on Lin's part. "The students leave class knowing more than they knew when they came in, so you feel like you had a really productive hour and fifteen minutes helping them," she said.

Lin finds that a balance between research and teaching helps her grow as a mathematician. If her research isn't going well, she can focus more on teaching to take her mind off things. And when she's ready to get back to research, she can do so with fresh eyes.

As she prepares to graduate, Lin is looking forward to a future in academia. Her current interest is in Diophantine geometry, a branch of number theory that studies the integer or rational solutions to polynomial equations (Diophantine equations) by examining the geometric properties of the shapes (or varieties) they define.

One piece of advice Lin would like to give current and future graduate students is to learn the value of downtime. "It's almost impossible to be productive if you tell yourself to work all the time," she said. In her first year at Harvard, she thought she needed to be working from 9 a.m. until 9 p.m. every day, including weekends. Burnout was inevitable. She learned to make time for her friends, taking up indoor climbing with her fellow graduate students. Lin also wishes more students knew to take advantage of the various opportunities open to them as part of the larger Harvard community. She herself played violin in the Mozart Society Orchestra, participated in a summer ceramics course through the Harvard Ceramics Program, and took two semesters of Chinese courses.

"I also like to cook a lot," Lin said. "I find it relaxing because it's something I do with my hands. It helps me take my mind off whatever I'm stuck on at the moment. I tell myself well, I have to eat, so let me focus on making this new recipe." She makes everything, from pasta, to soup, to dessert. She went through a breadmaking phase for a while. These days, she's learning to create the familiar flavors of Chinese cuisine.

First-Year Graduate Students

Zoë Batterman

Undergraduate Affiliation
Pomona College
Research Interests
I am interested in algebraic geometry, especially intersection theory and moduli.

Yuyuan Chen

Undergraduate Affiliation
University of Chicago
Research Interests
I am interested in probability and high-dimensional dynamic transport problems.

Jack Gallahan

Undergraduate Affiliation
Princeton University
Research Interests
I am broadly interested in algebraic geometry.

Chenxin Huang

Undergraduate Affiliation
Fudan University
Research Interests
I'm broadly interested in arithmetic geometry, especially aspects of which related to Hodge theory, moduli spaces, and Diophantine geometry. I also love to think about questions in arithmetic dynamics.

Logan Hyslop

Undergraduate Affiliation
UCLA
Research Interests
I study homotopy theory with a focus on applications to other fields of math. Some particular focuses of mine recently include tensor triangular geometry, algebraic K-theory and trace methods, and applications thereof to number theory.

Jiachen Kang

Undergraduate Affiliation
University of Michigan-Ann Arbor
Research Interests
I'm interested in algebraic and geometric topology, especially in applying higher category theory to concrete topological problems.

Donghae Lee

Undergraduate Affiliation
Seoul National University
Research Interests
I am interested in symplectic geometry and mirror symmetry.

Adam Melrod

Undergraduate Affiliation
University of Maryland-College Park
Research Interests
My interests are in dynamics, algebraic geometry, and model theory. I especially like to consider how these subjects interact. I also enjoy thinking about problems in computer science.

Jack Miller

Undergraduate Affiliation
Yale University
Research Interests
I am interested in arithmetic geometry and arithmetic statistics. Recently I have been thinking about probabilistic features of Malle's conjecture, obstructions to the local-global (a.k.a. Malle–Bhargava) principle in this setting, and relationships with 3-manifold invariants.

Chenglu Wang

Undergraduate Affiliation
University of Pennsylvania
Research Interests
Algebraic combinatorics and algebraic topology.

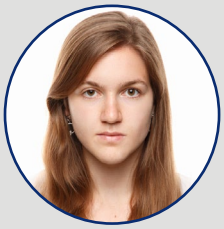
Janabel Xia

Undergraduate Affiliation
MIT
Research Interests
I am broadly interested in combinatorics and cryptography, including mathematical cryptography and computational number theory.

Yuchong Zhang

Undergraduate Affiliation
University of Michigan-Ann Arbor
Research Interests
I'm interested in algebraic combinatorics as well as its connection to geometry and topology.

Graduating Ph.D. Students



Katia Bogdanova

Advisor: Dennis Gaitsgory (MPIM)

Dissertation
Whittaker Coefficients in Quantum Geometric Langlands Program
What's Next
Gibbs Assistant Professor at Yale and a Member at the IAS.

Xinle (Clair) Dai

Advisor: Denis Auroux

Dissertation
Sectorial Decompositions of Symmetric Products of Surfaces and Homological Mirror Symmetry
What's Next
Postdoc at Rutgers.

Mitchell Lee

Advisor: Alexander Postnikov (MIT)

Dissertation
The Frobenius Transform and the Restriction Problem

Alice Lin

Advisor: Mark Kisin

Dissertation
Finiteness of Heights in Isogeny Classes of Motives
What's Next
A postdoctoral position at Northwestern in Fall 2026, followed by a three-year postdoctoral position at UC Berkeley.

Yu (Leon) Liu

Advisor: Mike Hopkins

Dissertation
En-algebras in m-categories
What's Next
Going into industry.

Taeuk Nam

Advisor: Dennis Gaitsgory (MPIM)

Dissertation
Towards a Tamely Ramified Geometric Langlands Correspondence
What's Next
One-year position at MPIM Bonn.

Rosie Shen
Advisor: Mihnea Popa

Dissertation
On Higher Singularities and Algebraic *K*-theory
What's Next
Postdoc at Stanford (Szëgo Assistant Professor).

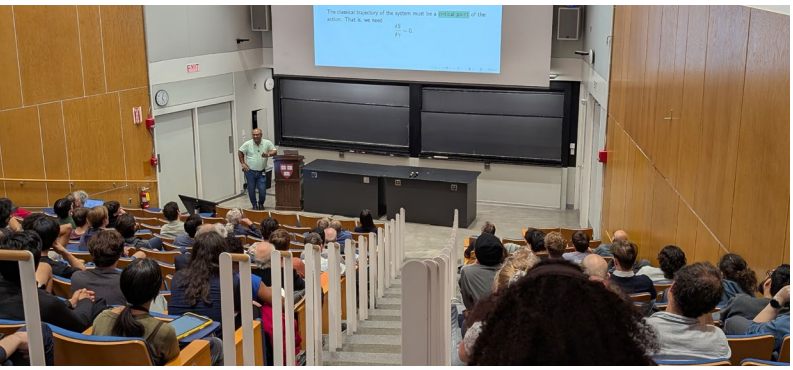
Natalie Stewart
Advisor: Mike Hopkins

Dissertation
Equivariant Higher Algebra
What's Next
Postdoctoral Fellow at Max Planck Institute for Mathematics (MPIM)

Eunice Sukarto
Advisor: Mike Hopkins

Dissertation
Power Operations Modulo Lubin-Tate Parameters Geometry
What's Next
Hedrick math fellow at UCLA with a year at MPIM.

Past Department Events



Millennium Prize Problems Lecture Series
September, 2025–April, 2026

Seven public lectures about the Millennium Prize Problems.

Speakers in order of lecture given: Michael Freedman (Harvard CMSA and Logical Intelligence), Sourav Chatterjee (Stanford), Pierre Deligne (IAS), Madhu Sudan (Harvard), Barry Mazur (Harvard), Javier Gómez-Serrano (Brown University), Peter Sarnak (IAS)

Jameel Al-Aidroos Mathematical Pedagogy Lecture Series
September 29, 2025

The fourth annual Jameel Al-Aidroos Mathematical Pedagogy Lecture Series.

Speaker: Emily Braley (Johns Hopkins University)

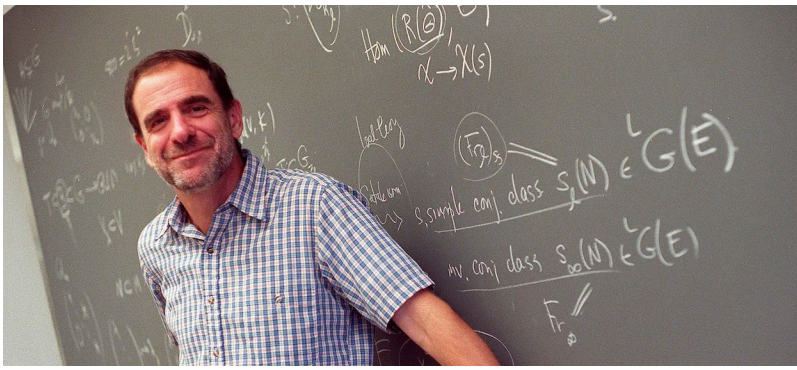
Upcoming Department Events

CDM

Current Developments in Mathematics
November 19–20, 2026

An annual conference jointly hosted by Harvard University and the Massachusetts Institute of Technology, and devoted to surveying the most recent developments in all areas of mathematics.

Speakers: TBA



Number Theory and Representation Theory: The Legacy of Benedict Gross, and Beyond
March 15–19, 2027

A conference in memory of Benedict “Dick” Gross.

Speakers*: Jennifer Balakrishnan (Boston University), Joe Buhler (Reed College), Samit Dasgupta (Duke University), Noam Elkies (Harvard), Jessica Fintzen (Universität Bonn, Germany), Wee Teck Gan (National University of Singapore), Joe Harris (Harvard), Mike Hopkins (Harvard), Barry Mazur (Harvard), Curtis McMullen (Harvard), Aaron Pollack (UC San Diego), Dipendra Prasad (Indian Institute of Technology Bombay), Gordan Savin (University of Utah), Marie-France Vigneras (Institut de Mathématiques de Jussieu Paris), Nolan Wallach (UC San Diego), Shou-Wu Zhang (Princeton

**Speakers subject to change.*

Department Honors and Awards

Hollis Professorship of Mathematicks and Natural Philosophy
Laura DeMarco, Professor of Mathematicks and Natural Philosophy

Leroy P. Steele Prize for Seminal Contribution to Research, 2026
Horng-Tzer Yau, Merton Professor of Mathematics

MacArthur Fellowship, 2025
Lauren Williams, Dwight Parker Robinson Professor of Mathematics

New Horizons in Mathematics Prize, 2026
Yunqing Tang ‘16, Ph.D.

Undergraduate Achievements

Alexander Prize
Ilaria Seidel ‘26

American Rhodes Scholar Class of 2026
Jay Chooi ‘26, Emma Finn ‘26

David Mumford Prize
Emma Finn ‘26, Easton Singer ‘26

Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student, 2026
Received by Yunseo Choi ‘25, with honorable mention for Eliot Hodges ‘25

Friends Prize
Adelina Andrei ’26, Jinho Park ‘26

Hoopes Prize
Math concentrators: Adelina Andrei ’26, Kevin Cong ‘26, Matthew Tan ‘26
Secondary allied math concentrator: Miller MacDonald ‘26

Robert Fletcher Rogers Prize
Preston Bushnell ’26, Josh Rooney ‘26

William Lowell Putnam Mathematical Competition
Harvard undergraduate students who finished in the top 100 out of over 4,300 students taking the exam:
Kevin Cong ’26 | Andrew Gu ’26 | Shokhruz Kakharov ’27 | Radu Andrei Lecoiu ’26

Visit our website for the full list of honors and awards, including those announced after May 15, 2026.

Credits

PRODUCTION MANAGER

Anastasia Yefremova | Communications Specialist

CONTRIBUTORS

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Cindy Jimenez | Undergraduate Program Coordinator
Barry Mazur | Gerhard Gade University Professor
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Melanie Matchett Wood | William Caspar Graustein Professor of Mathematics, Director of Graduate Studies

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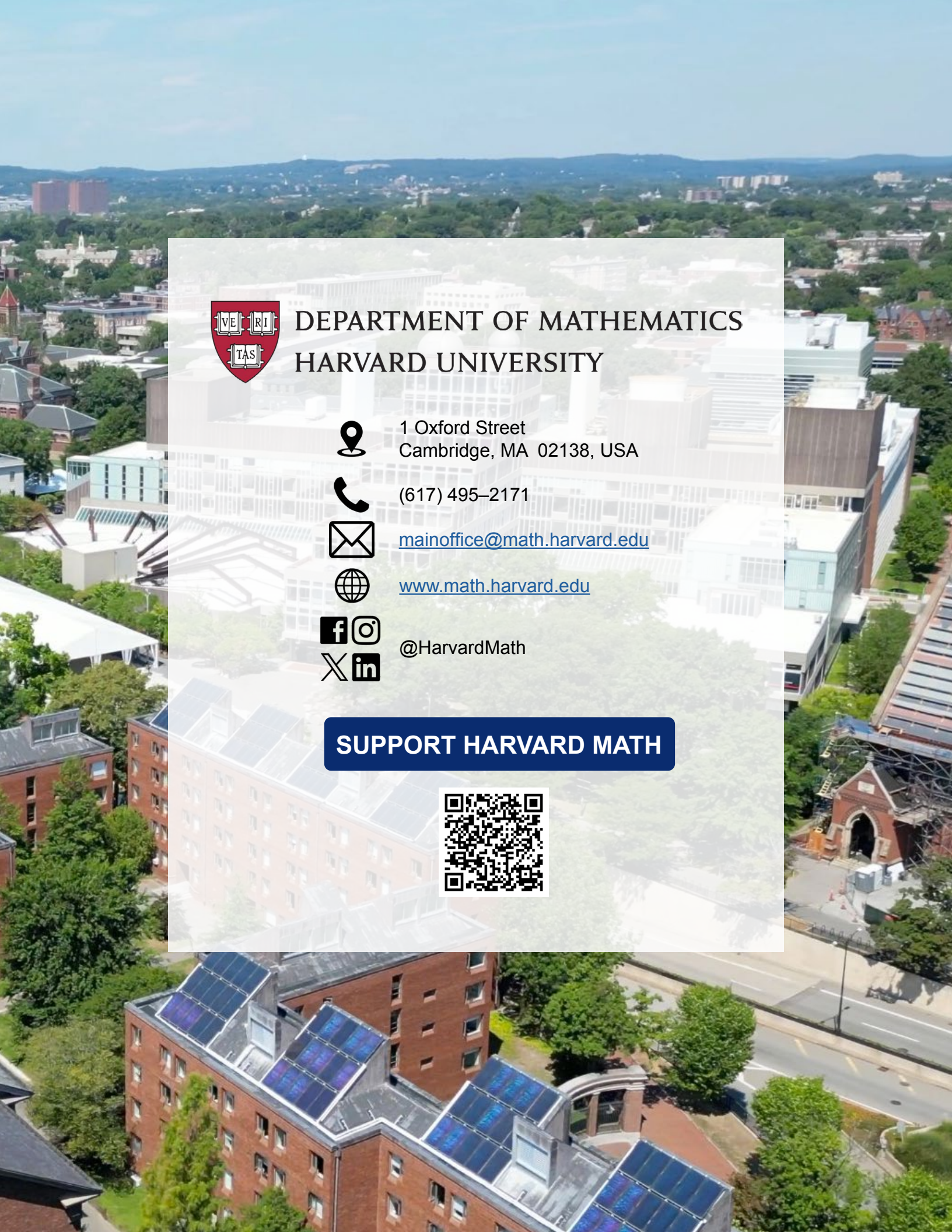

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