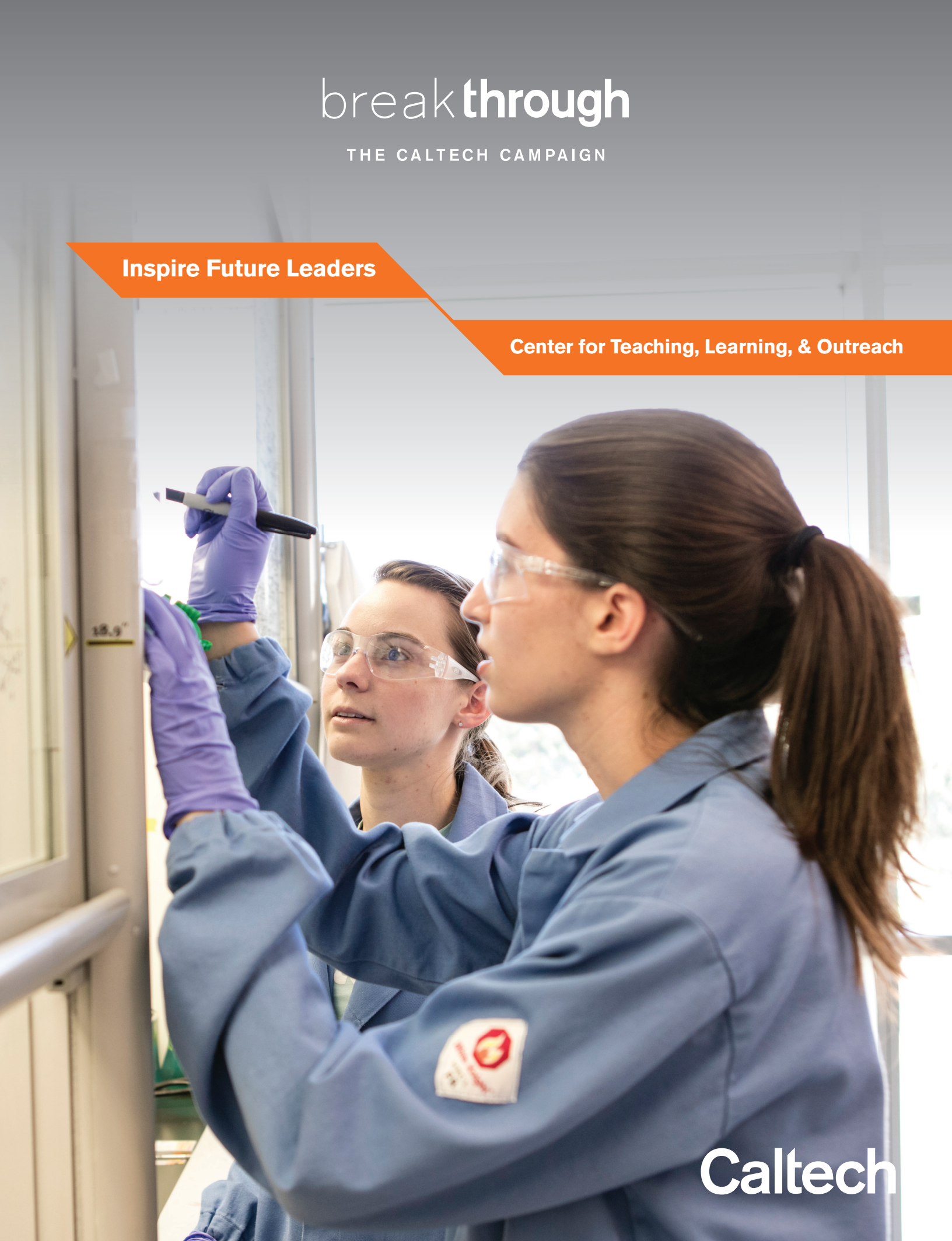


breakthrough

THE CALTECH CAMPAIGN

Inspire Future Leaders

Center for Teaching, Learning, & Outreach



Caltech



**“THE BEST TEACHING AND
OUTREACH CREATE
MOMENTS OF DISCOVERY**

when both teachers and students find new ways to realize their talents and ambitions. Caltech aims to create these turning points.”

PRESIDENT THOMAS F. ROSENBAUM
Sonja and William Davidow Presidential Chair
and Professor of Physics

**“BEING A GOOD TEACHER,
BEING A GREAT TEACHER,
IS SO INTEGRAL FOR
DEVELOPING THE PASSION**

of the next generation of scientists. Teaching some of the brightest young minds in the current generation is just an amazing opportunity.”

ANNELISE THOMPSON
Graduate Student in Chemistry



The World Needs Caltech

As a top-tier research and educational institution, Caltech is committed to shaping problem solvers who can make leaps of imagination and mentor new generations of influential, bold thinkers. Society is counting on these Caltech scientists and engineers to tackle the challenges of our time.

Yet the answers to complicated, broad-scale problems will likely not be found through conventional teaching methods. In 2012, Caltech established the Center for Teaching, Learning, and Outreach (CTLO) to help faculty and students develop the tools they need to creatively teach and learn

complex material in the classroom and in the lab.

Virtually every member of the Caltech community is a teacher—from students who coach their classmates to Nobel laureate professors. Undergraduates become role models for peers, graduate students serve as TAs, and post-

docs mentor others in the lab.

By investing in CTLO, you will ensure that all students and faculty receive access to the enhanced teaching and learning resources they need to solve problems that others have deemed “impossible.” Together, we can rise to the challenge.

Caltech's Center for Teaching, Learning, & Outreach (CTLO)

Caltech students have long benefitted from a 1:3 ratio of faculty to undergraduates, frequent collaboration with peers, and opportunities to conduct research with prominent scientists and engineers. Now, through CTLO, Caltech is becoming a flagship for educational excellence and innovation.

TEACHING

Since 2012, CTLO has launched programs for the entire campus community that aim to improve teaching skills and encourage professors to try new methods. These include an annual teaching conference, new teaching-focused courses and workshops, and TeachWeek, a campus-wide celebration of pedagogy. Instructors at all levels, from teaching assistants (TAs) through early- and later-career faculty, use CTLO resources.

With support from CTLO staff, many faculty are re-designing courses to enhance the classroom experience. Professors are refining lecture techniques and using new educational technologies, such as flipping classes so that students watch lectures online and come to class for practice and interaction, and teaching open online courses called MOOCs. Faculty and TAs may request data-driven feedback on their teaching from CTLO, and obtain expert follow-up help. When

integrated, these instructional methods are helping to spark students' thinking in new ways.

LEARNING

When students are empowered to take ownership over their own learning process, they begin to see themselves as scientists and act as peer mentors. Through CTLO, students can now attend teaching seminars, take courses exploring educational research, and earn certificates in university teaching. Stu-



dent leaders are now collaborating with faculty to design new and better courses. Professors and TAs are communicating more effectively and together creating innovative solutions that better support the learning process for students.

OUTREACH

CTLO helps Caltech faculty and students design and conduct compelling educational outreach projects that inspire thousands of local students, many from underserved communities, each year. Young people are introduced to STEM through summer and school-year programs, at Caltech and in schools, while K-12 teachers receive professional development, coaching, and opportunities to work alongside faculty research teams. These outreach programs are making Caltech more competitive when applying for federal research funding and are developing the next generation of scientists and engineers.

www.ctlo.caltech.edu

Impact and Fast Facts



200

CTLO collaborated with two-thirds of Caltech professors in the Center's first three years. Over half participated more than once, and all Divisions were represented.



100%

CTLO operates a number of programs to prepare 100% of graduate students and TAs for the demands of university-level teaching.



10,000

CTLO outreach benefits thousands of local students and teachers each year, many from underserved schools and districts.



745,000

Online courses supported by CTLO bring Caltech to hundreds of thousands of learners worldwide.



#1

In 2016, CTLO won Caltech's first Team Impact Award, recognizing significant contributions to Caltech's mission and establishing the Center as a critical facet of the Institute.

“CTLO IS HELPING TO REVOLUTIONIZE THE WAY WE TEACH AT CALTECH,

and that impact will be felt long into the future. Its staff has made a difference to me at every stage, from teaching me how to teach in new ways to providing in-depth assistance.”

ANTONIO RANGEL
Bing Professor of Neuroscience,
Behavioral Biology, and Economics



A Community of Teachers and Learners: CTLO Case Studies

“BEING A TEACHING ASSISTANT HERE AT CALTECH IS, IN ONE WORD, AWESOME. I’VE NEVER BEEN TO A UNIVERSITY WHERE THE OUTREACH, THE TEACHING OPPORTUNITIES, THE EMPHASIS ON TEACHING ARE SO IMPORTANT!”

—BRENDON McNICHOLAS,
Graduate Student in Chemistry



Reinventing the Classroom

Rick Flagan wanted his Computational Methods in Chemical Engineering course to be lively, connecting big ideas with practical work, but the conventional classroom stifled interaction. CTLO provided Flagan with mini-projectors and movable whiteboards.

“Having students work on problems in a way that I could see their code projected in real time allowed me to better understand their thinking, ask them questions, and make corrections right away. Students really appreciated the change,”

says Flagan, the Irma and Ross McCollum–William H. Corcoran Professor of Chemical Engineering and Environmental Science and Engineering.

Learning through Teaching

When undergraduate Kshitij Grover started volunteering to teach computer science to local kids after school in CTLO’s Coding Club program, he thought teaching would be a “piece of cake.”

“Boy, was I wrong,” Grover says. “Teaching these young kids with CTLO’s support has taught me more than I could have ever imagined.”

Transforming Courses

Jaksa Cvitanic made his pricing options course

available online, enriching his Caltech classroom and expanding it to the public. “Without CTLO’s great support on course organization, advice on educational approaches, and more, it wouldn’t have been possible,” says Cvitanic, the Richard N. Merkin Professor of Mathematical Finance.

Student Anusha Nathan commented: “When you go to class, instead of being lectured at, you’re up at the board, working in small groups, and really getting insight into how to do these problems.”



PHOTOS: Cover: Undergraduate student Ciara Ordner (right) with graduate student Julie Hoftra in the lab of chemistry professor Sarah Reisman. First Panel: Mechanical and civil engineering professor Domniki Asimaki talking with undergraduate students. Interior: (Left) Summer undergraduate research fellows in 2016 discussing their projects with each other and with mathematics professor Elena Mantovan. (Center) Student with chemistry professor Sarah Reisman. (Right) Caltech students in Physics 1A - Credit: Martin Springborg. Back: (Top) Ryan Patterson (BS '00) assistant professor of physics - Credit: Martin Springborg. (Bottom) Pasadena elementary school students during a field trip to Caltech's Seismo Lab - Credit: Mitch Aiken. Photos by max s. gerber unless otherwise indicated.

www.ctlo.caltech.edu

Support Teaching, Learning, & Outreach

CONNECT WITH US

To learn more about how you can inspire future scientists and engineers by supporting Caltech’s CTLO, please contact:

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Founding Director

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626-395-6225

Through the work of CTLO, Caltech is building a future where the strength of the Institute’s teaching, learning, and outreach are as robust as its research.

Your investment in CTLO will help to bolster the teaching and learning experience at Caltech, while also shaping new generations of leaders in science and engineering.

You can choose to support any number of CTLO’s teaching, learning, and outreach projects. Each gift—from annual contributions to named endowments that provide resources for generations to come—will enable CTLO to support increasing numbers of Caltech students and faculty in their pursuit of knowledge.

The researchers of tomorrow need great teachers, today.