

- Caltech welcomes a new archivist
- What it takes to clean LIGO's instruments
- Grad students head up a revamped chemistry class
- Meet the Class of 2021

Cloud Sourcing

Caltech climate scientists help bring an artist's cloudy vision to life

How much does a cloud weigh? That was the question on Karen LaMonte's mind when she emailed Caltech climate scientist Tapio Schneider. LaMonte—an artist known for her monumental sculptures—wanted to make a cloud sculpture, but with a twist. She would find a cloud to use as a model and make the sculpture's weight equivalent to the original cloud.

"We see [clouds] floating in the air," says LaMonte. "We think of them as fluffy cotton balls. But they're actually amazingly heavy. I thought, wouldn't it be amazing if we could get a 'real' cloud and carve it in marble?"

Schneider, the Frank J. Gilloon Professor of Environmental Science and Engineering, who also has a joint appointment with JPL, was intrigued. His work focuses on reducing uncertainties in climate change projections—in part through modeling cloud formation to better understand clouds' impact on the environment. Collaborating with LaMonte, he reasoned, could help raise awareness of these issues.

continued on page 6 ▶





Cloud Sourcing

► continued from previous page

Observations of clouds with enough detail to translate into a sculpture are not available, but the equations governing clouds are known, and so the structure of clouds can be computed. Caltech research scientist Kyle Pressel, who is part of Schneider's group, worked closely with LaMonte to produce the cloud simulation from which she would create her sculpture.

Their goal: model conditions that would create a cumulus cloud worthy of sculpting. The result? "A classic cumulus you'd see while lying on a beach in Barbados," says Pressel.

To transform the virtual cloud model into an actual sculpture, LaMonte again turned to technology, using a robot for the initial carving. "Only by using technology could I make the diaphanous solid and the intangible permanent," she says.

It took the robots four weeks of carving and LaMonte an additional four weeks of hand-finishing before the 15-ton block of marble assumed its final form as *Cumulus*, a 7-foot-tall, 2.5-ton sculpture. *Cumulus* will remain on exhibit outside Venice's Palazzo Cavalli-Franchetti during the Venice Biennale, through November 26, 2017.

Read more about Karen LaMonte and Tapio Schneider's collaboration at magazine.caltech.edu/post/LaMonte

As well as being stellar scholars, our newest freshmen have some impressive talents. They have:

Baked a replica of the periodic table with cupcakes

Engineered and designed roller coasters

Climbed Mt. Whitney three times

Performed as a stand-up comic

Manually built a functioning AI composer

Played ice hockey on the Lady Huskies Travel Hockey Team

Meet the Class of 2021

Total # of applications:
7,339
(highest ever)

Offers of admission:
568
(7.7% admit rate, lowest ever)

Enrolling freshmen:
236*

*As of printing

Women:
46%
(ties % record from 2015)

Underrepresented minorities:
16%

From public or charter high schools:
71%

First generation:
5%

Class Act:



Chemistry graduate students **Rebekah Silva** and **Kelsey Boyle** reinvented and launched **Chemistry 101** last spring quarter as a low-stakes way for Caltech undergraduates to explore topics in chemistry that pique their interest. Taught entirely by graduate students and postdocs, the course also gave Silva, Boyle, and their peers a chance to hone their teaching skills.

Bite-sized learning

A group of six tutorial courses, Ch 101 focuses on topics outside of the main chemistry curriculum: revolutionary inorganic molecules, chemical nanoscience, ultrafast laser spectroscopy and microscopy, astrochemistry, a survey of the chemical biology literature, and a look at trends in cancer treatment strategies. With these bite-sized offerings, which undergrads can take either for a grade or as pass/fail, "students get a chance early on to explore an area of interest with little risk," says Silva.

Head of the class

"I had opportunities to tutor in college and found a lot of purpose from it," says Silva, who graduated from Stanford in 2012. "I wanted to take the next step of creating course con-



"I hung up the phone and just sat there for a second. I was going

back through it in my mind, saying 'They did say yes, right? And they got the right person?'"

—Caltech postdoc **Jessica Watkins** on learning she had been selected for NASA's 2017 Astronaut Class

Graduate student **Kelsey Boyle**, who is co-teaching (with **Rebekah Silva**), a tutorial course on DNA and cancer for the newly reinvented Chemistry 101.

tent and being the instructor." Graduate student **Olivia Wilkins** was excited about the opportunity Ch 101 gave her to bring her fascination with astrochemistry to Caltech's undergrads. "I had this vision of sharing it with people and immediately a course outline popped into my head," she says.

Next level

Silva hopes her students take away from the course a new way of understanding information. "The way I understand, for example, nucleic acid biology is very different from when I was an undergraduate," she says. "We thought it would be great to structure a class to help students organize information more in a way that an expert does."

Teaching the teachers

To help the graduate students and postdocs make the leap into teaching, each grad student or postdoc had a faculty mentor and consulted with the Center for Teaching, Learning, and Outreach. **Harry Gray**, Caltech's **Arnold O. Beckman Professor of Chemistry**, was impressed with the dedication of the rookie professors. "The people who signed up are kids who already love teaching," he says. "It's easier to work with them because they really want this and they're fired up."

Read more about Chemistry 101 at magazine.caltech.edu/post/Chem101