

## Invest in bold ideas. Support UC graduate students.

The graduate students visiting with lawmakers for UC Graduate Research Advocacy Day pursue important and audacious research on issues relevant in California and beyond. Their work is typical of the kinds of research happening across UC campuses and graduate programs each day.

### UC BERKELEY

#### **A cleaner approach to wastewater treatment – Jennifer Lawrence**

Wastewater treatment plants in the San Francisco Bay Area discharge significant amounts of nutrients into San Francisco Bay, where they can harm aquatic plants and animals. Environmental engineering grad student Jennifer Lawrence researches ways to sustainably remove these nutrients from wastewater discharge before they reach local water bodies.

#### **Sizing up gentrification’s health impacts – Melody Tulier**

With many San Francisco Bay Area neighborhoods experiencing major demographic shifts and gentrification, public health grad student Melody Tulier is looking to see how these changes impact health disparities among the urban poor. Her research looks at the changing social, physical and economic resources available in Alameda County neighborhoods to pinpoint how they affect the health of long-term residents.

### UC DAVIS

#### **Measuring emissions beyond the tailpipe – Hanjiro Ambrose**

To measure how well fuel-efficient vehicle technologies reduce greenhouse gas emissions, it’s not enough to look at what they do on the road. Electric vehicles often include batteries and lightweight body materials that are more carbon intensive to produce. Transportation technology graduate student Hanjiro Ambrose studies the impact of vehicles over their entire life cycle to help consumers make better choices and to improve carbon reduction policies.

#### **Investigating an autism risk – Jacqueline Barkoski**

Could a common household pesticide be associated with an increased risk for autism? Epidemiology doctoral student Jacqueline Barkoski is testing 170 pregnant women for traces of pyrethroid pesticide—a common substance in household and industrial sprays—to see whether in utero exposure correlates to an increased likelihood that babies develop autism.

## UC IRVINE

### **Building an antibacterial booby trap – Julius Edson**

Chemical engineering grad student Julius Edson has developed a novel therapy to treat drug-resistant bacteria. It uses tiny particles of ground shrimp shells to physically destroy the bacteria, together with a dose of gene therapy to disrupt its production of proteins responsible for drug resistance.

### **Thinking globally, acting microbially – Nameer Rahman Baker**

Could tiny organisms at the center of the life cycle help preserve agricultural productivity as regions become arid? Ecology grad student Nameer Rahman Baker investigates the microbes that break down organic matter to see how these quickly evolving organisms adapt. His insights could help regions maintain ecological productivity in the face of climate change.

## UCLA

### **Resilient parenting in the face of stress – Ruth Ellingsen**

Having an optimistic outlook enables parents to keep their cool even in the face of especially demanding child-rearing situations, according to research by psychology grad student Ruth Ellingsen. She studies parents of children with behavioral and developmental challenges to see what factors enable them to maintain a positive parenting style.

### **What drives transportation decisions – Carole Turley Voulgaris**

By delving into data from state and national transportation surveys, urban planning grad student Carole Turley Voulgaris analyzes the factors that affect how people choose to get around. The aim: inform policies to reduce driving so that they are grounded in people's real-world needs and concerns.

### **Taking inventory of California's groundwater supply – Michelle Miro**

Civil engineering grad student Michelle Miro combines satellite imaging with local ground monitoring of wells to get a picture of how and where groundwater is changing in California, particularly in the Central Valley. Her research maps hot spots for groundwater depletion.

### **Sizing up seismic safety – Christopher Segura**

Small changes in construction and building codes could make California cities more resilient after a massive quake, according to civil engineering grad student Christopher Segura. His research points to safety measures that would make buildings less vulnerable to aftershocks and easier to repair and rebuild.

# UNIVERSITY OF CALIFORNIA

## UC MERCED

### **Solar energy made in the shade – Andrew Zumkehr**

Some 3,000 miles of canal send water from California's reservoirs to parched corners of the state—enough to stretch across the U.S. coast to coast. Environmental systems doctoral student Andrew Zumkehr is working with the California State Water Project to explore covering the canals with solar-topped shade structures, a project that could conserve millions of gallons of water now lost to evaporation, while creating a new source of clean electricity.

### **Taking aim at childhood obesity – Beatriz Sosa-Prado**

With Latino youth at increased risk of suffering from obesity, Beatriz Sosa-Prado's research looks at how cultural practices and values can promote healthy eating and physical activity, as well as how the health behaviors of children change over time, the longer they reside in the U.S. Her findings can help California health officials improve the environment in which people live, eat, learn and play.

## UC RIVERSIDE

### **Clearing the air on wastewater emissions – Pedro Piqueras**

Uncovered wastewater treatment ponds produce millions of tiny airborne particulates that enter the lungs and cause dangerous health effects, according to research by chemical engineering grad student Pedro Piqueras. As the state builds more of these plants, covering the pools with concrete could significantly curb the risk.

### **Informing Investment in water infrastructure – Juan Carlos Lopez**

Economics grad student Juan Carlos Lopez looks at historical data on agriculture, economic output and migration to assess the costs and benefits of building complex water transportation systems. His models seek, in part, to quantify the return on investment of importing water to drier zones.

## UC SAN DIEGO

### **Tinkering with bacteria – Benjamin Rubin**

Like a kid taking apart a toy car to understand what makes it go, biological sciences grad student Benjamin Rubin breaks pieces off bacteria cells to provide insights into the fundamental mechanics of how they work. This foundational understanding is critical to the developing field of synthetic biology, which seeks to use the single-cell organisms as platforms to produce valuable products, from pharmaceuticals to biofuels.

### **Plugging leaks in the math pipeline – Tracey Kiser**

Education doctoral student Tracey Kiser is testing new approaches to help community college students succeed in developmental math. Her research uses the firsthand perspectives of students and faculty to inform strategies that can lead to more effective teaching of the subject.

# UNIVERSITY OF CALIFORNIA

## UC SAN FRANCISCO

### **Unlocking the productive power of yeast – Ben Heineike**

Biology grad student Ben Heineike is looking to understand how yeast cells evolve—yielding insights that could facilitate using yeast as a production platform for industrial chemicals, fuels and medicines, as well as offering important clues to our own biology. His work focuses on signaling pathways, which evolve rapidly to help cells interact with the outside world.

### **Tracking a tiny cancer culprit – D’Juan Farmer**

The work of biochemistry grad student D’Juan Farmer focuses on very, very tiny RNA that regulate gene expression, which have been implicated in cancer and other diseases. A better understanding of how these molecules work in healthy humans can inform treatments for when things go wrong

## UC SANTA BARBARA

### **Understanding the brain in action – Deborah Barany**

The most basic of human movements require a complex and highly orchestrated coordination of muscles. Neuroscience grad student Deborah Barany uses advanced imaging technology to identify patterns and areas of the brain that coordinate different types of movement. Among other applications, such insight can be used to help paralyzed people move again with the help of high-tech prosthetics controlled directly by signals from the brain.

### **Managing forests in an era of drought – Christopher Heckman**

Trees filter carbon, prevent erosion and provide a host of other critical services, but they are also thirsty consumers of groundwater. Environmental science grad student Christopher Heckman is creating highly-localized models that can help officials test various forest management solutions. The goal: minimize wildfire risk and groundwater depletion, while maintaining lush, healthy forests.

## UC SANTA CRUZ

### **Tuning in to the harmony of nature – Andrea Steves**

How does drought affect the sound of a forest? In work that brings musicians together with environmental scientists, digital arts grad student Andrea Steves and her colleagues are using soundscapes to document changes in the environment. Their work employs tiny microphones to capture sounds such as bark beetles at work in trees, insects under the soil and the underwater symphonies of local creeks and streams to produce an audio landscape of biodiversity.

### **Netting an emerging seafood risk – Corinne Gible**

Blooms of a blue-green algae that release a dangerous toxin have long been a problem in freshwater environments. However, when the toxin suddenly began appearing in marine waters in Monterey Bay, ocean sciences grad student Corinne Gible wondered how local shellfish, wildlife and public health might be affected. Her research found that California mussels have the ability to take up this toxin and retain it for weeks at a time.