



Innovation and Prosperity at Risk

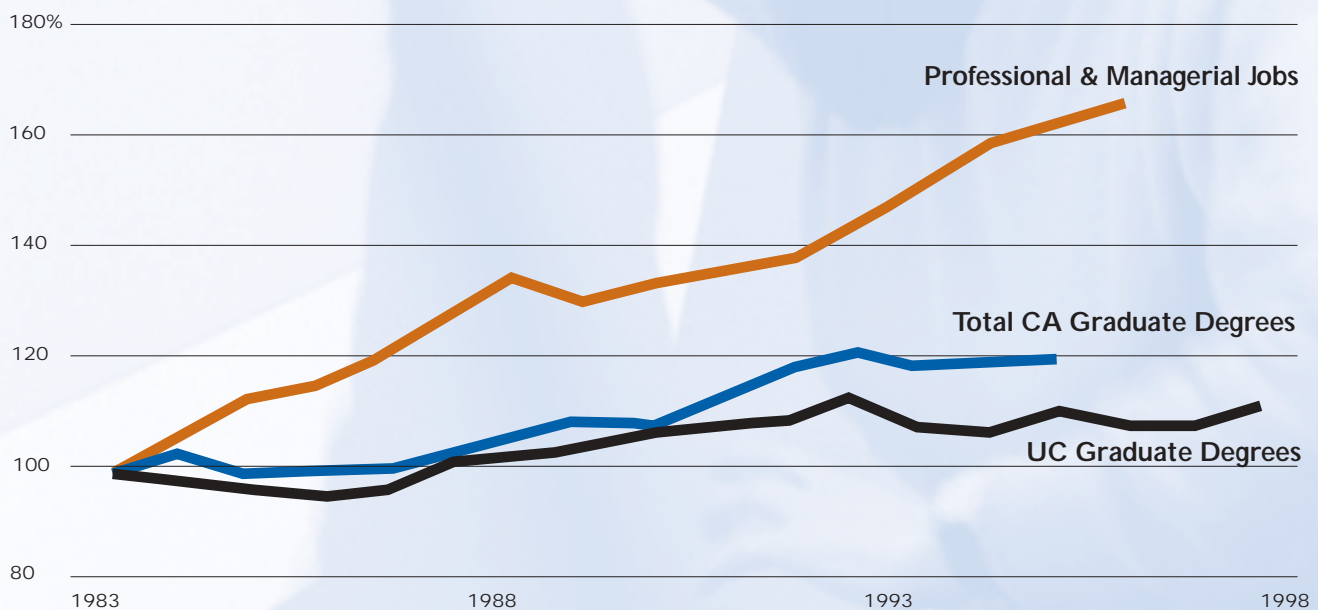


Investing in
Graduate Education
to Sustain
California's Future



The gap between current job growth and the supply of future skilled workers puts California's prosperity at risk.

*Once ahead . . .
now behind*



ELECTRONICS

Inventing California's high-tech economy. California's economic prosperity relies heavily on the creativity and entrepreneurial talents of its high-tech centers and the jobs they produce. Much of that creativity starts with UC and other universities that educate the highly trained scientists, engineers and managers who become high-tech innovators. One key player in California's high-tech innovation and dominance is **Andrew Grove**, Ph.D. in **chemical engineering**, **UC Berkeley**, 1963, and a founder, current chairman and former CEO of Intel Corporation—the world's largest maker of the silicon microchips that store and process information on computers.

As a young Ph.D., Grove and his Fairchild Semiconductor colleagues helped create the modern silicon microchip by solving the problem of how to make silicon stable. The discovery helped revolutionize computer chip-making and gave Silicon Valley its name.

COMMUNICATIONS

Widening the Information Highway. Just as computers and microchips sparked the first wave of the electronics revolution, the Internet and new communications technologies are fueling the second wave. At the crest of this next generation of high-tech innovation is **Henry Samueli**, who co-founded Broadcom, a leading provider of integrated circuits that compress enormous amounts of data, voice and video content to send over phone lines, cable TV networks, DSL, satellites and wireless devices. More and more of us use these technologies each day, for example to access email from cell phones.

Samueli, who received his Ph.D. in **electrical engineering** from **UCLA** in 1980 and later served on the UCLA faculty, is one of the foremost experts in broadband communications circuits. Founded in 1991, Broadcom now employs about 2,500 people worldwide.

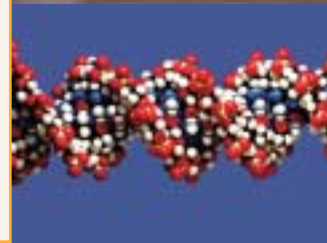
In 2000, Samueli and his wife gave \$50 million to the engineering schools at both UCLA and UC Irvine as a way both to give back to the university and to help meet California's need for high-tech employees.

COMMUNITY LEADERSHIP

Leading our communities and colleges. **Judith Valles** has left her mark on California's colleges and communities—first as a teacher at all levels of California's public schools, then as a community college teacher, administrator, trustee and president, and now as mayor of San Bernardino.

Valles received her M.A. in **Spanish literature** at **UC Riverside** in 1970 and taught Spanish at California community colleges for many years. Her leadership skills were quickly recognized, and she also began moving into important administrative positions. In 1988, she was appointed president of Golden West Community College—the first Latina college president in California.

After “retiring” from higher education, Valles returned to her hometown and was elected mayor in 1998, becoming the first Latina mayor of a city of over 100,000 population. Today, bringing new jobs and capitalizing on the city's assets through redevelopment are among her top priorities.



EXPLORATION

Reaching for the stars: UC's astronauts.

UC's graduate programs enable Californians to reach new heights—never was that more true than for astronaut **Leroy Chiao**. As a youngster in northern California, Chiao watched on TV as astronaut Neil Armstrong took his first steps on the moon. He decided then to become an astronaut.

But when he applied for astronaut training, NASA told him to complete his doctoral education and get some work experience first. Chiao completed his Ph.D. in **chemical engineering** at **UC Santa Barbara** in 1987, a valuable background for a NASA mission specialist. Four years later, after working at Hexcel Corporation and Lawrence Livermore Labs, Chiao realized his dream. Now a veteran of three space flights, he will lead a crew on a four-month stay on the Space Station next year.

UC graduate programs have been the path to the stars for other astronauts too: **Tamara E. Jernigan** and **Mary E. Weber** (**UC Berkeley**), **Tracy Caldwell** (**UC Davis**), **Anna Lee Fisher** and **John L. Phillips** (**UCLA**), and **Steven A. Hawley** (**UC Santa Cruz**).



“The industries of the future have to be invented. They don’t just exist. . . . No country acquires these industries without effort and without making the investments necessary to create them.”

Lester C. Thurow
Economist, MIT

INTERNATIONAL IMPACT

Providing leadership around the world. The influence of UC's graduate programs goes beyond our borders. Many of our graduate students from other countries return home to become world leaders in government, science, industry and culture.

One such leader is **Miguel Angel Rodriguez**, elected President of Costa Rica in 1998. Rodriguez received his Ph.D. in **economics** from **UC Berkeley** in 1966 and spent many years of service in Costa Rica's political and financial communities before becoming president. His vision for Costa Rica focuses on promoting national unity, strengthening democracy, reactivating the economy, and reducing poverty.

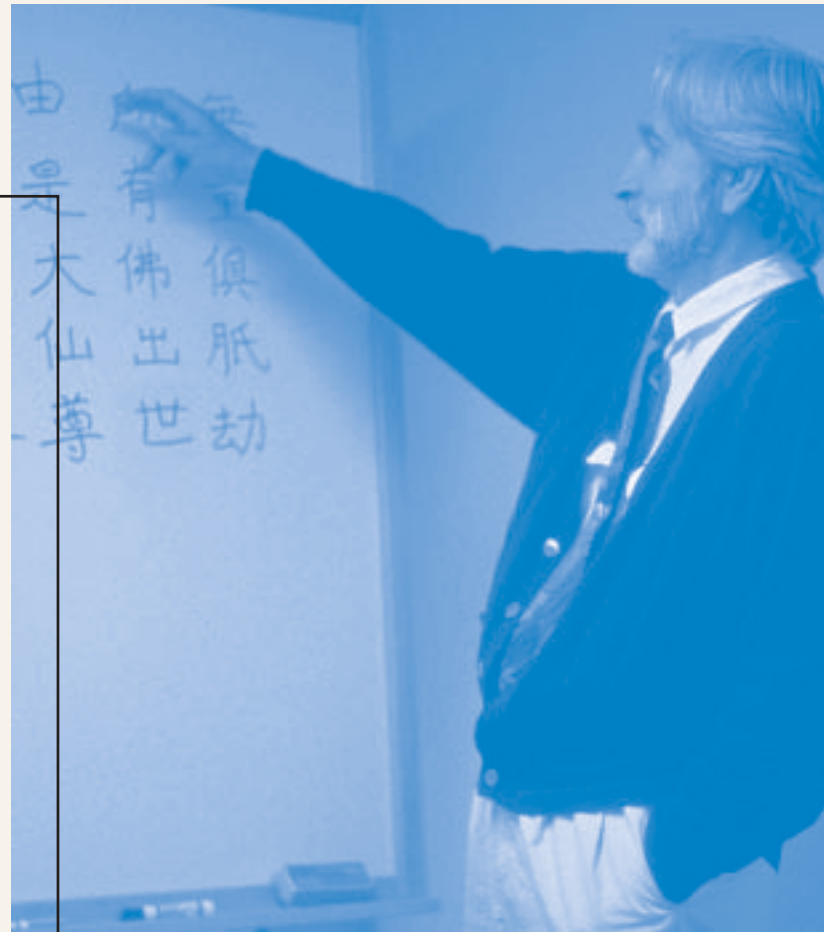
Many other graduate students from UC campuses have gone on to serve in crucial leadership positions spanning the globe—from Portugal to Thailand and South Korea to Saudi Arabia and Sudan.

Today's innovations emerged from California's investment in graduate education in the '60s and '70s.

BIOTECH

Sequencing the human genome. Over the past decade, scientists have worked to sequence the human genome—our DNA instructions—which will revolutionize the prevention and treatment of genetically based diseases. Last year, two research teams were racing to complete decoding and assembling the human genome. But both groups had a seemingly insurmountable problem: how to assemble the multitude of disjointed sequence fragments into a coherent sequence. Without that sequence, the data are meaningless.

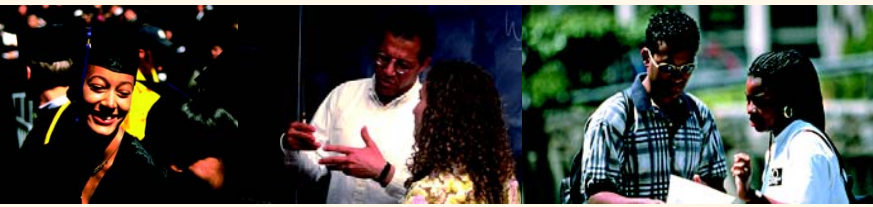
Enter **James Kent**, a current **UC Santa Cruz** Ph.D. student in **biology**. Combining his experience in computer programming with his understanding of genetics, Kent—in just four weeks—developed a complex computer program that assembled genomic information from the random DNA fragments. He then developed a web browser that allows researchers to identify the location of specific genes. Each day, thousands of researchers access this site, and many add their own data to it.



“Having experienced firsthand the benefit of the high-quality education provided by the University of California, I can think of no higher priority for California’s and the nation’s future than the support of such an outstanding university system.”

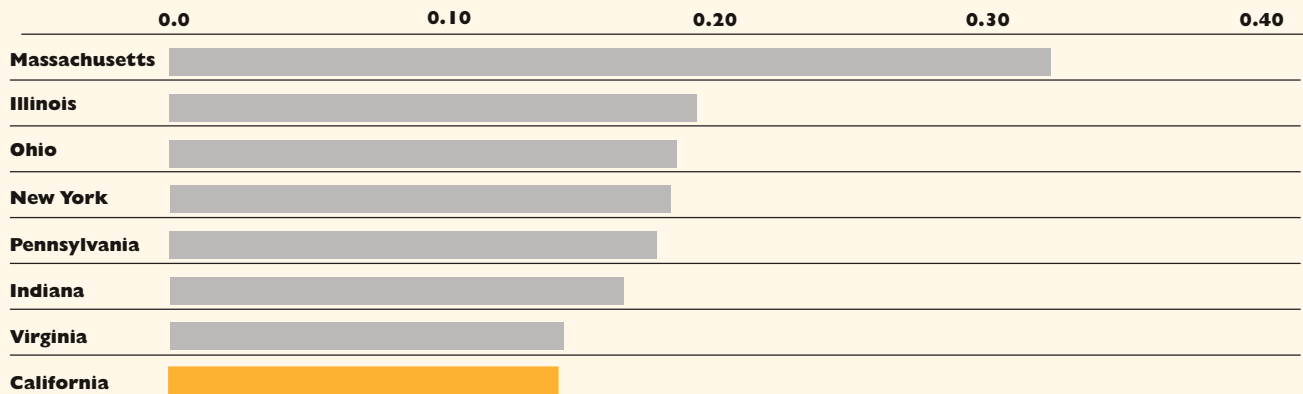
Henry Samueli
Broadcom Corp. co-founder

...but California has fallen behind.



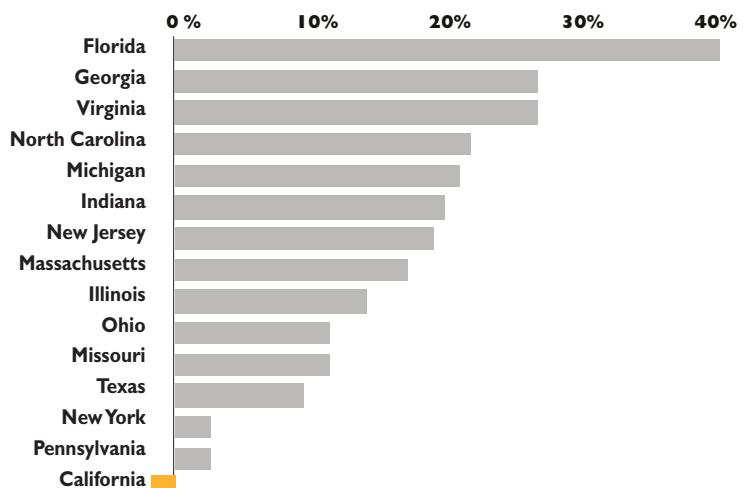
Compared with other states, California educates a very low proportion of graduate students.

Doctorates Awarded Per 1,000 Population



California falls dead last among the 15 largest states in growth in graduate enrollments over the last decade.

Percent change in graduate enrollments in the U.S. and the 15 largest states 1986-96



California is one of only five states in which graduate enrollments declined during the last decade. (The others are Arkansas, Connecticut, Kansas and Oklahoma.)



The proportion of graduate students at UC is lower than at other comparable universities.

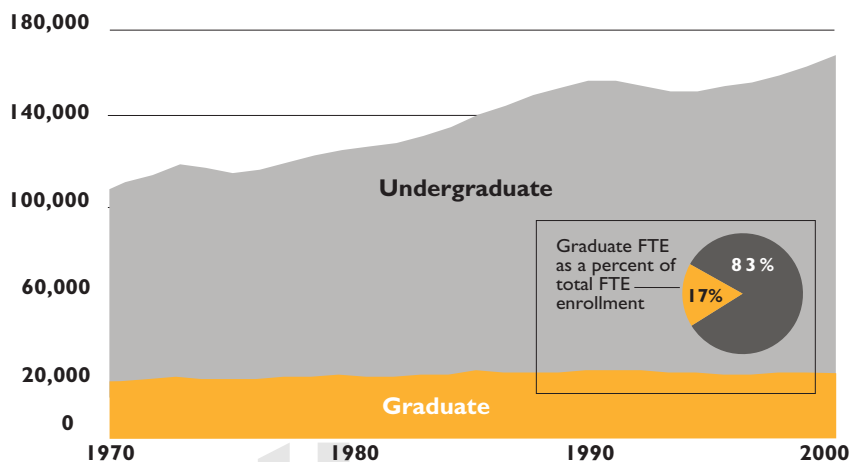
	UC	Illinois Michigan SUNY-Buffalo Virginia	Harvard MIT Stanford Yale	11 Public Research Universities
All graduates as a percent of total enrollment	17%	27%	51%	25%
Graduate academic	13%	15%	31%	16%
Graduate professional (master's degree)	4%	12%	20%	9%

“California is falling behind competing high-tech states in terms of the quantity of inputs into the academic scientific process (faculty and Ph.D. candidates).”

California Council on Science and Technology, November 1999

At the University of California, graduate enrollment has hardly grown at all in the past 30 years. It has climbed 7 percent, compared with 100 percent growth in undergraduate enrollment.

UC Undergraduate and Graduate Enrollments 1970 to 2000



underinvesting

California's future needs creative solutions and visionary thinkers.

SOCIAL PROBLEMS

Bringing technology jobs to the streets. In a low-income section of the San Francisco Bay Area, about 30 young adults are engaged in an intensive six-month program designed to move them from unemployment or dead-end jobs to well-paying jobs as computer technicians and system administrators. They are enrolled in Street Tech, a nonprofit organization that provides free computer training, certification and job placement for 18-40 year olds from immigrant, low-income and other disadvantaged communities.

Using the analytical skills and knowledge he developed in *UC San Diego's International Relations and Pacific Studies Program* (master's degree, 1995), **Paul Lamb** co-founded Street Tech to help people get the education and skills needed to move out of poverty. Almost all of the graduates in Street Tech's first two classes have landed jobs in the computer industry—and Lamb wants to replicate similar programs elsewhere in California and the U.S.

TEACHING

Making early childhood better. **Andrew Kennedy** has worked as a teacher and administrator at the K-12 and college levels, but his heart is in helping young children to succeed. As director of the Los Angeles County Office of Education's Head Start/State Preschool Division, Kennedy helps 25,000 low-income children and families through a range of early education, job, family and health programs. He has also developed Early Childhood Educators Institutes that help educators use brain research to enhance their curriculum and teaching.

Kennedy's work in education gave him a keen awareness of the difficulties that outside agencies like Head Start can encounter when working with large school districts and nonprofit agencies. As a *UCLA* doctoral student in *educational leadership*, Kennedy (Ed.D., 1997) created a new training model used in dozens of school districts and nonprofit agencies to improve the ways that public and private agencies work with Head Start programs.

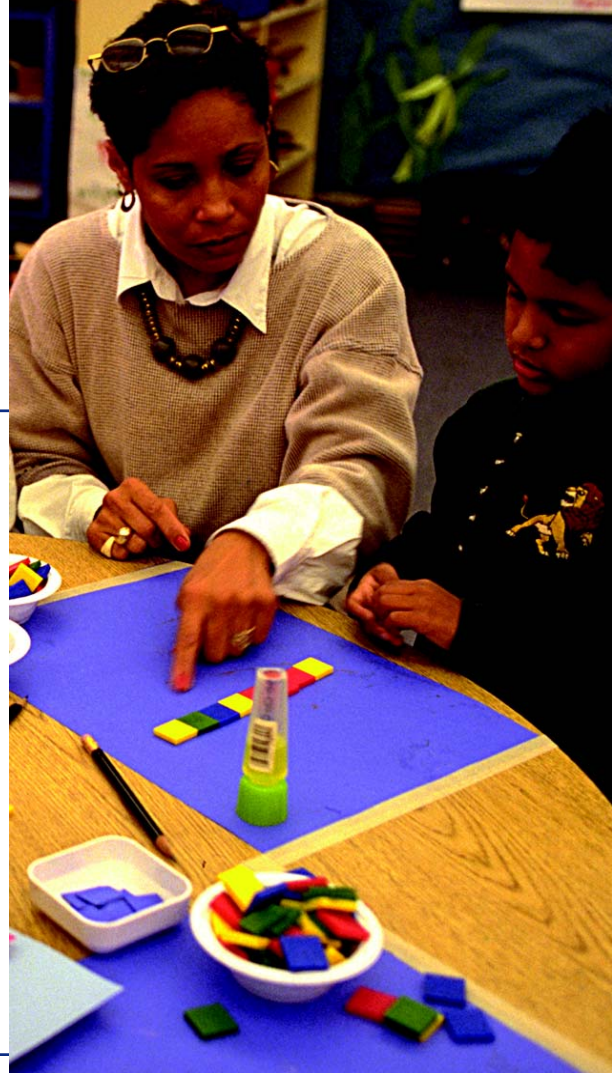
"The Internet boom ran out of juice because we ran into an innovation shortfall."

John Doerr
Venture capitalist
Kleiner, Perkins, Caufield & Byers



MAKING NEW THINGS

Making new materials to repair injured bodies. Each year, millions of men and women sustain injuries to their hips or knees or are debilitated by arthritis—some so severely that their ability to walk may become seriously limited. But now research is allowing more and more such individuals to regain their mobility, through the development of new materials that can replace damaged joints or bones. One leader in this effort is **Daniel E.E. Hayes, Jr.** As a doctoral student in **biomedical engineering** at **UC Davis** (Ph.D., 1991), he contributed to the development of Robodoc—the world’s first robotic surgical technology for prosthetic implants. Since then, Hayes has pioneered the development and manufacture of high-tech orthopedic joint replacement implants for hips and knees. His company now distributes its products on four continents.



CREATIVE WRITING

Exploring culture. A Jewish teenager flees Nazi Europe in 1939, and arrives in New York with little except talent as an illustrator and a willingness to take risks. That’s the start of *The Amazing Adventures of Kavalier & Clay*, an epic novel about the rise of the modern comic book industry in the shadow of World War II, which won **Michael Chabon** the 2001 Pulitzer Prize for Fiction. Another of his well-known works was put on the big screen last year as “Wonder Boys.”

Like many other emerging writers, Chabon’s talent was nurtured at **UC Irvine’s creative writing program**, where he received his M.F.A. in 1987. There, one of his faculty mentors recognized his talent and sent Chabon’s thesis to his literary agent. Published in 1988 to critical acclaim, the thesis became Chabon’s first novel, *The Mysteries of Pittsburgh*.

Nationally known for turning out talented writers and poets, UC Irvine can count two other recent Pulitzer Prize winners among the program’s alumni—**Richard Ford** (1996) and **Yusef Komunyakaa** (1994).

the world

BIOMEDICINE

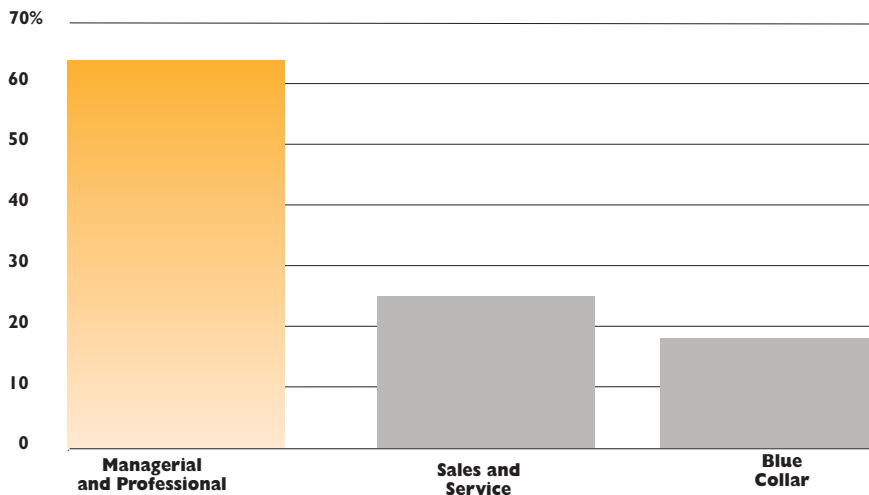
Finding treatments for life-threatening diseases. As a biotech research scientist at Amgen, **Teresa Burgess** is working to make a difference in the battles against cancer, osteoporosis, Alzheimer’s and other diseases. Burgess is leading a team of researchers developing a promising new drug to fight a variety of cancer tumors. Her research also contributed significantly to developing another drug, currently undergoing clinical trials, that may help prevent and reduce debilitating bone loss among older adults and bone pain caused by tumors.

Burgess, who received her Ph.D. in **biochemistry** at **UC San Francisco** in 1987, also plays a leading role in charting the direction of California’s breast cancer research as chair of the Breast Cancer Research Council. The innovative state-funded California Breast Cancer Research Program funds promising research and helps translate it into public health practice.

California's future strength depends on investing now in graduate education.

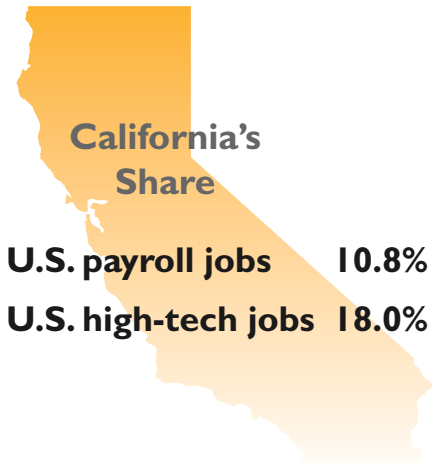
California's economy depends on it.

Job Growth in the Past 15 Years | 1983-1998



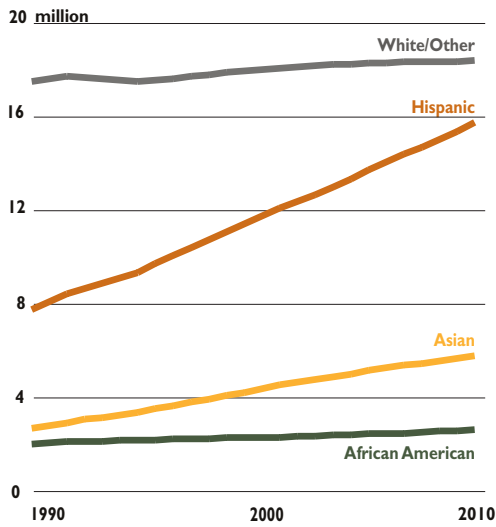
“Inside the minds of our graduate students lie the next Intel, Genentech or Qualcomm. We must invest now and not shortchange our greatest asset.”

Susan Hackwood
Executive Director
California Council on
Science and Technology

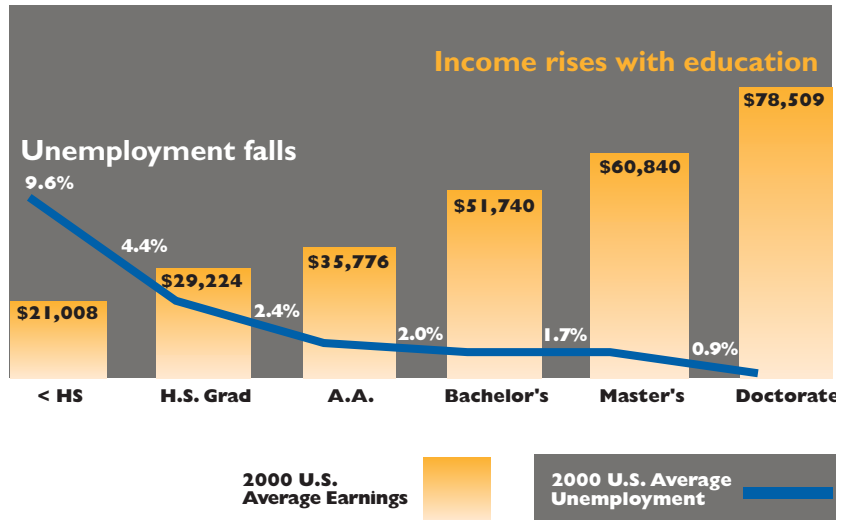


California's people will benefit.

Diversity is increasing



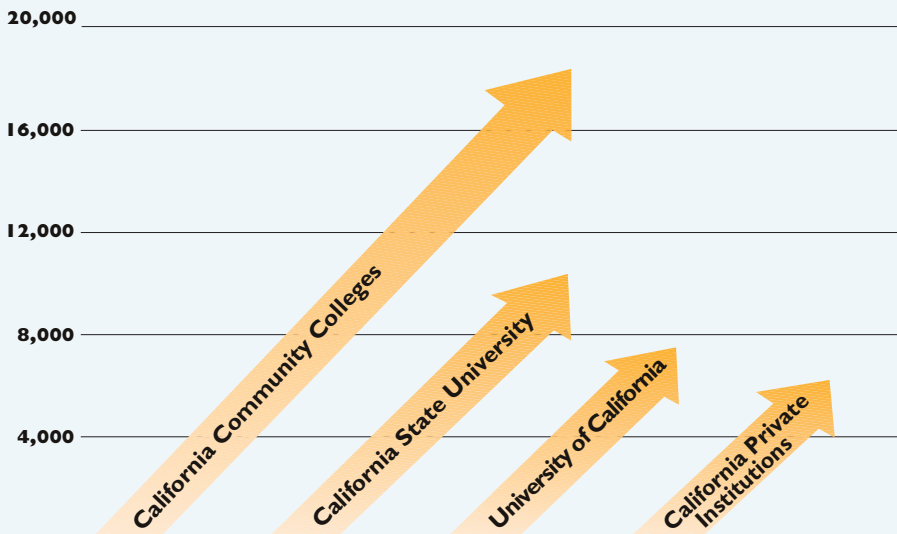
Education makes a difference



opportunities for Californians

California's undergraduates need it.

40,000 new faculty needed by 2010



Taking the initiative: a 50% increase by 2010.

- Innovation is crucial to keep California competitive.
- California's huge growth in undergraduates gives our state great potential.
- UC is poised to add at least 11,000 graduate students in the next decade.

What's needed to reach this goal?

A solid academic foundation

- Quality programs
- Excellent faculty
- Supportive campus environment

Expanded graduate outreach programs

Affordable housing (especially for first-year graduate students)

More competitive financial support for students

- To fund the increased numbers of students
- To attract the best students in an increasingly competitive market



“The University of California must keep pace by increasing graduate education programs to meet industry’s thirst for knowledge-based workers. Failure to do so will diminish California’s competitive position in the global economy.”

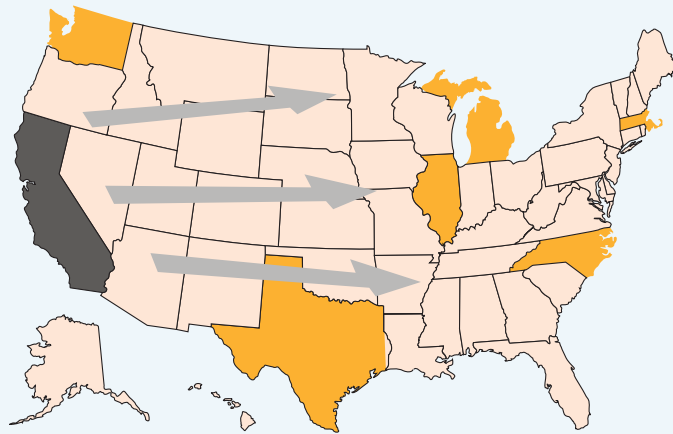
Tom Burnham
Vice President of Human Resources
Allergan, Inc.

world-class

“Companies have recognized that the supply chain of qualified workers is no longer just the K-12 level, the skilled workforce supply chain is K-Ph.D.”

Michaela Platzer
Vice President, American Electronics Association

UC is losing excellent students who are getting better offers elsewhere.



Currently, UC graduate students live on just \$22,000 per year. They work, borrow or use their savings to pay for 75-85% of that amount. From this they must pay UC fees and tuition.

“I asked UC if they would offer me any money, and they told me that they don’t have sufficient funding in their department.”

UC Graduate Student Support Survey, 2001

“The total lack of funding from UC, as opposed to very generous funding from a (nearly) comparable school (Michigan) made it very hard to go to Berkeley.”

UC Graduate Student Support Survey, 2001



By 2010, UC will need to spend annually in addition to current available funding:

Teaching assistantships	\$50 million
Research assistantships	\$75 million
Fellowships and internships	\$90 million
Total	\$215 million

campuses

UC is committed to being the best in the nation for graduate education.

UC will sustain and enhance the excellence of its faculty and programs as it grows in the next decade.

UC has a strong base to build upon:

- Of the 229 doctoral programs ranked by the National Research Council, more than half are in the top 20 in their fields, and more than one-third are in the top 10.
- Continuing to hire the best faculty in the nation is UC's highest priority during this growth period.

UC will strive to guarantee affordable housing for every first-year graduate student who wants it.

UC will actively foster the development of scholars:

- Ensure excellent faculty mentoring
- Communicate departmental expectations clearly
- Provide opportunities in every program for students to practice the skills and habits of scholars
- Create more community spaces for graduate students to interact with each other and with faculty
- Assist graduate students with career planning and placement for non-academic and academic jobs
- Become more actively family-friendly—child care, insurance and adequate housing



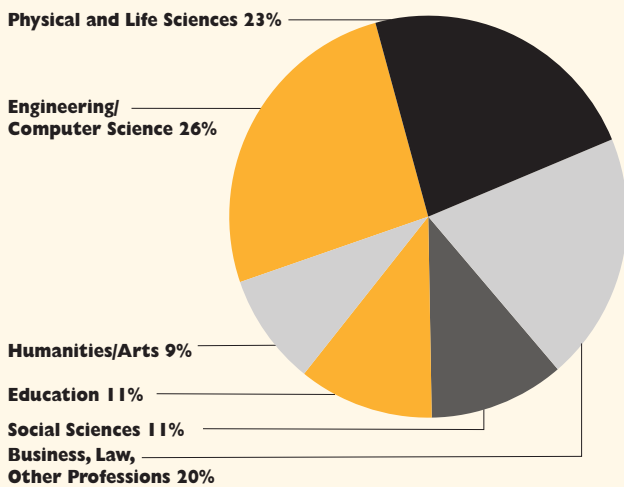
“The university [is] a collector of talent—a growth pool that attracts eminent scientists and engineers, who attract energetic graduate students, who create spin-off companies, which encourages other companies to locate nearby.”

Richard Florida, *Economist, Carnegie-Mellon*

assist students

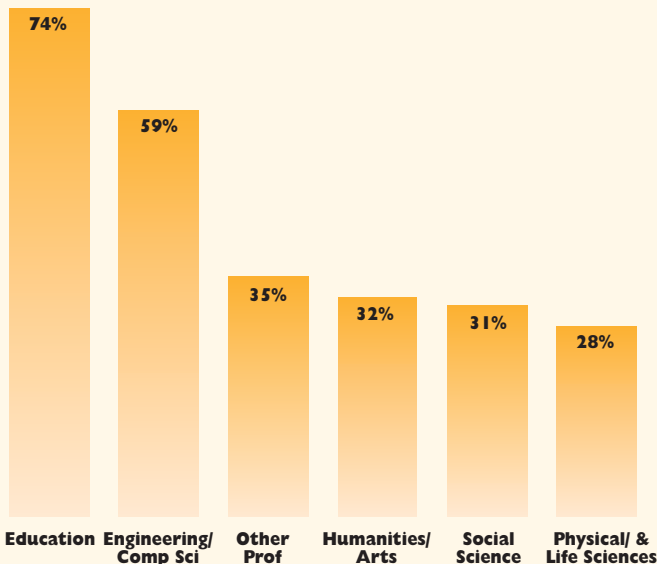
UC will match growth to needs and opportunities.

UC's Plans for Graduate Enrollment Increase



affordable housing

Percent increase in UC Graduate Enrollment 2000-2010



“As never before, there is, and will increasingly be, a premium on American workers who can read and understand complex material, think analytically and use technology efficiently.”

21st Century Workforce Commission
Appointed by President and Congress

How can you help?

- Expand state research assistantships in areas of interest to California
- Expand outreach programs for graduate students and include funds for fellowships
- Create a Cal Grant program of need-based aid for graduate students

- Make the living expense portion of graduate fellowships non-taxable
- Exempt RA and TA salaries from income taxes
- Remove the current cap on the amount of loan interest a graduate student can deduct
- Expand the HOPE tax credit to graduate education

State Government

- ▶ Create a repayable State Postsecondary Teaching Fellowship Program for teaching in California colleges and universities

Federal Government

- ▶ Increase the number of federal fellowships and raise stipend levels
- ▶ Support increases in university research funding

Partnerships and Joint Efforts

- ▶ Fund State Incentive Grants for students awarded prestigious national fellowships
 - Create a state tax credit to companies that support graduate education
 - Increase matching opportunities

Industry

- ▶ Sponsor collaborative industry-UC internships for graduate students

Foundations and Private Donors

- ▶ Contribute to a California Fellowships Endowment

- Increase support for science and engineering students
- Support joint projects that explore the social and cultural effects of science and business

- Increase existing graduate fellowship programs
- Create bequests or living trusts focused on graduate student support
- Develop annual giving programs directed to graduate student support

University of California

Commission on the Growth and Support of Graduate Education

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Regent (Co-Chair)

C. Judson King

Provost and Senior Vice President-Academic Affairs (Co-Chair)

Richard Attiyeh

Vice Chancellor for Research and Dean of Graduate Studies, UC San Diego

Clifford Brunk

Chair, Coordinating Committee on Graduate Affairs (CCGA)

Joseph Castro

Director, Academic Programs, UC Merced

Ralph Cicerone

Chancellor, UC Irvine

Michael Cowan

Chair of the Academic Council

Debbie Davis

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Claudia Mitchell-Kernan

Vice Chancellor, Graduate Studies and Dean, Graduate Division, UCLA

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