State: California (CA)

Capital City: Sacramento

Major Cities: Los Angeles, San Diego, San Jose, San Francisco, Fresno, Long Beach

Major companies: Apple, McKesson, Chevron, Wells Fargo, Alphabet, Intel, Disney, Hewlett Packard Enterprise, Cisco Systems, HP, Oracle, EBay, Netflix

Major Sectors/Economy:

- The economy of California is the largest in the United States, boasting a $3.137 trillion gross state product as of 2019.
- If California were a sovereign nation (2020), it would rank as the world's fifth largest economy, ahead of India and behind Germany.
- California's Silicon Valley is home to some of the world's most valuable technology companies, including Apple, Alphabet Inc., and Facebook.
- In total, over 10% of Fortune 1000 companies were based in California in 2018, the most of any state.
- As both the most populous US state and one of the most climatologically diverse states, the economy of California is varied, with many sizable sectors
- The most dominant of these sectors include Finance, Business services, Government and Manufacturing
- Much of the economic activity is concentrated in the coastal cities, especially Los Angeles, which has a relative focus on media—most notably Hollywood—and the San Francisco Bay Area, which predominantly concentrates on technology
- Both cities, along with other major ports such as San Diego, also act as significant trade hubs to and from the United States.
- California's Central Valley is one of the most productive agricultural regions on Earth, growing over half the country's fruits, vegetables, and nuts
- In 2010, there were more than 663,000 millionaires in the state, more than any other state in the nation

Los Angles:

- 2nd most-populous city in the United States.
- It's one of the world's centers of media, business, and international trade
- A global city, it has been ranked 6th in the Global Cities Index and 9th in the Global Economic Power Index.
- The LA combined statistical area (CSA) also has a gross metropolitan product (GMP) of $831 billion (as of 2008), making it the third-largest in the world.
- The economy is driven by International Trade, Entertainment, Aerospace, Technology, Petroleum, Fashion, Apparel, and Tourism.
- The city was home to six Fortune 500 companies.
- Leading Companies: Occidental Petroleum Corporation, Health Net, Inc., Reliance Steel & Aluminium Co., AECOM Technology Corporation, Oaktree Capital Group, LLC, CBRE Group, Inc.

San Diego:

- The largest sectors of San Diego's economy are defense, military, tourism, international trade, and manufacturing
- In 2014, San Diego was designated by a Forbes columnist as the best city in the country of launch a small business or startup company
- San Diego hosts several major producers of wireless cellular technology
- Wireless industry manufacturers headquartered here include Qualcomm, Nokia, LG Electronics, Kyocera International, Cricket Communications and Novatel Wireless
- In 2013, San Diego had the second largest biotech cluster in the US with more than 400 biotechnology companies

San Francisco:

- San Francisco is home to the region's financial and business industry, tourism and is the host to numerous conventions.
- The east bay, centered around Oakland, is home to heavy industry, metal working, oil and shipping, while Silicon Valley is a major pole of economic activity around the technology industry
- In all, the Bay area is home to the second highest concentration of Fortune 500 companies
- From 2012 to 2017, the San Francisco metropolitan area added 400,000 new jobs
- Fortune 500 companies located in the region:
- Technology companies Google, Apple Inc., Hewlett Packard, Intel, Applied Materials, eBay, Cisco Systems, Yahoo!, Symantec and Oracle.
- Energy companies Chevron, Calpine Corporation and PG&E
- Financial service companies Charles Shwab Corporation, Visa Inc., and Wells Fargo
- Apparel retailers Gap Inc. and Levi Strauss & Co.
- The largest manufacturers include Tesla Inc., Lam Research, Bayer, Chevron and Coca-Cola

University Eligibility and Fee:

University	Bachelors Eligibility	Bachelors Fee Range/yr	Masters Eligibility	Masters Fee Range/yr
University of California-Berkeley	GPA – 3.8 SAT– 1250 -1500 ACT – 29-34	$40,434	GRE-320+ GPA-3.7/80%+ TOEFL-100/IELTS-7.0	$29,480
University of California – Davis	GPA – 3.7 SAT– 1070-1340 ACT – 24-30	$40,434	GRE-320+ GPA-3.7/80%+ TOEFL-100/IELTS-7.0-7.5	$28,700
University of California – Irvine	GPA – 3.7 SAT – 1040-1310 ACT – N/A	$40,434	GRE-320+ GPA-3.7/80%+ TOEFL-100/IELTS-7.0	$32,487
University of California – Los Angels	GPA – 3.8 SAT – 1270-1500 ACT – 30 -33	$40,434	GRE-320+ GPA-3.7/80%+ TOEFL-100/IELTS-7.0-7.5	$32,374

University of California – San Diego	GPA – 3.7 SAT – 1210-1450 ACT – 27-32	$40,434	GRE-320+ GPA-3.7/80%+ TOEFL-100/IELTS-7.0	$32,457
University of California – Santa Barbara	GPA – 3.7 SAT – 1130-1370 ACT -24-30	$40,434	GRE-320+ GPA-3.7/80%+ TOEFL-100/IELTS-7.0-7.5	$28,656
University of California – Riverside	GPA – 3.6 SAT – 1020-1250 ACT – 22-28	$40,434	GRE-315+ GPA-3.5/75%+ TOEFL-100/IELTS-7.0	$32,481
University of Southern California	GPA – 3.7 SAT – 1270-1500 ACT -30-33	$55,320	GRE-315+ GPA-3.5/75%+ TOEFL-100/IELTS-7.0-7.5 CS-GRE – 310/80%	$43,890
San Jose State University	GPA – 3.5 SAT – 1010-1230 ACT – 22-28	$17,622	Engineering GRE – 300+ GPA-3.5/75%+ TOEFL – 80/IELTS – 6.5 Software Engg GRE – 305-310 CS GRE-315+, Job Exp	$16,358
San Francisco State University	GPA – 3.5 SAT – 1010-1230 ACT – 22-28	$17,622	GRE – 305+/AWA – 4.0 GPA – 3.5/75%+ TOEFL – 80/IELTS – 6.5	$15,040
San Diego State University	GPA – 3.5 SAT – 1010-1230 ACT – 22-28	$17,622	GRE – 300+ GPA – 3.3/75%+ TOEFL – 80/IELTS – 6.5	$16,072
California State University - Sacramento	GPA – 3.4 SAT – 930-1130 ACT – 19-24	$17,622	GRE – 300+ GPA – 3.5/70%+ TOEFL – 80/IELTS – 6.5	$15,800
California State University - Long Beach	GPA – 3.5 SAT – 1010-1230 ACT – 22-28	$17,622	Computer Science GRE – 300+ GPA – 3.3/70% TOEFL – 80/IELTS – 6.5 Engineering GRE – 298	$14,568
California State University - Fresno	GPA – 3.4 SAT – 790-1010 ACT -16-21	$17,622	GRE – 300+ GPA – 3.3/70% TOEFL – 80/IELTS – 6.5	$15,147
California State University - East Bay	GPA – 3.4 SAT – 930-1130 ACT – 19-24	$17,622	GRE – 295+ GPA – 3.3/70% TOEFL – 80/IELTS – 6.5	$15,546
California State University – San Marcos	GPA – 3.4 SAT – 930-1130 ACT – 19-24	$17,622	GRE – 295+ GPA – 3.3/70% TOEFL – 79/IELTS – 6.0	$16,264
California State University – San Bernardino	GPA – 3.4 SAT – 930-1130 ACT – 19-24	$17,622	GRE – 295+ GPA – 3.3/70% TOEFL – 79/IELTS – 6.0	$14,726
California State University – Fullerton	GPA – 3.4 SAT – 930-1130 ACT – 19-24	$17,622	GRE – 295+ GPA – 3.3/70% TOEFL – 79/IELTS – 6.5	$15,489
California Lutheran University	GPA – 3.0 SAT – NR	$42,210	GRE –NR GPA – 3.0/60%	$15,390

	ACT -NR		TOEFL – 79/IELTS – 6.0	
National University	GPA – 3.0 SAT – NR ACT -NR	$13,320	GRE –NR GPA – 3.0/60% TOEFL – 79/IELTS – 6.0	$15,000
University of Redlands	GPA – 3.4 SAT – 930-1130 ACT – 19-24	$49,154	GRE – 295+ GPA – 3.3/70% TOEFL – 79/IELTS – 6.5	$20,328

University Key points:

University	Key Points
University of California – Berkeley	• Founded in 1868 • UC Berkeley is No. 1 in the latest U.S. News & World Report rankings of public national universities • Total student enrollment, Fall 2017 - 41,910 • Berkeley alumni, faculty and researchers include 94 Nobel laureates • In fiscal year 2015, Berkeley spent $789 million on R&D • Olympic medals won by students and alumni - Gold 103, Silver 47, Bronze 33 • 17:1 Student-to-faculty ratio • Acceptance Rate - 17.3
University of California – Irvine	• Founded in 1965 • UC Irvine is Ranked 9 in the US by U.S. News & World Report rankings • 29 Graduate Programs ranked in Nations top 50 - U.S. News & World Report • Enrolments (Fall 2017) - 35,958 • 1,70,000+ Alumni • In fiscal year 2013, Berkeley spent $348 million on R&D • UC Irvine offers 80 undergraduate degrees and 98 graduate and professional degrees
University of California – Los Angeles	• Founded in 1919 • Centered in one of the most influential cities in the world • 52% of UCLA students receive some sort of financial assistance • 38% of UCLA UG students receive Pell grants • 13 Nobel Prizes • More than 140 companies have been created based on technology developed at UCLA • 261 Olympic medals • U.S. News & World Report introduced a Global Ranking in 2014. UCLA is number 13 in that ranking (2018) • Times Higher Education ranks UCLA 15th in its World University Rankings (2017-18) • 1 Billion Dollars in Research funding annually

	• 1075 Active US Patents in portfolio
University of California – San Diego	• Founded in 1956 • 15th in U.S. News & World Report 's 2017 global university rankings • UC San Diego faculty, researchers and alumni have won 20 Nobel Prize • over 550 student organization
University of California – Santa Barbara	• Founded in 1891 • In its 2013 ranking of the world's top 500 universities, Leiden University ranked UC Santa Barbara number 2 in terms of impact in the field of the sciences • U.S. News and World Report's 2018 "Best Colleges" guide, the most widely read college guide in the country, ranks UCSB number 8 among all public universities • Almost 60 local companies have been established based on technology developed or discovered at UCSB, and, on average, four to six new companies based on UCSB research are formed every year. • 1,000+ acres on the California coast • UCSB's faculty includes six Nobel Prize winners • UCSB enrolls more than 23,000 students • More than 200 majors, degrees, and credentials are offered through UCSB • UC Santa Barbara spent $236.5 million on research and development in fiscal 2013
University of California – Davis	• Founded in 1905 • In its 2018 rankings of the nation's best colleges, U.S. News and World Report placed UC Davis 12th among public national universities • 34th best College of Engineering (U.S. News & World Report's "America's Best Graduate Schools" 2018) • $704 million research funding for 2014-15 • 35,415 Enrolled students • Over 5,300-acre campus is in the city of Davis
University of California – River Side	• Founded in 1954 • 23,278 total students enrolled in Fall 2017 ○ U.S. News and World Report Survey (2018) ranked UC Riverside in the following: ○ 124th in National Universities ○ 58th in Top Public Schools ○ 78th in Best Colleges for Veterans ○ 82nd in Engineering Programs (undergraduate) ○ 78th in Business Schools (undergraduate) • UCR offers 101 Bachelor's, 52 Master's, 42 Ph.D. programs
University of Southern California	• 45,500 students enrolled in 2017 • Financial Aid Expenditures (2017-18 fiscal year) - $549 million • Founded in 1880

	• It is the oldest private research university in California • The Wall Street Journal and Times Higher Education ranked USC 15th • USC has nearly $700 million in annual research expenditures
San Jose State University	• San Jose State is conveniently located on 154 acres in downtown San Jose • Founded in 1857 • Offers 145 areas of study with an additional 108 concentrations. • SJSU's total enrollment was 32,154 in fall 2016 • Silicon Valley firms and agencies seek SJSU students for internships, summer work programs and for assistance with research and development projects • Silicon Valley firms employ more graduates from SJSU than from any other university in the nation
San Francisco State University	• Founded in 1899 • 141 acre campus with 118 Bachelor's, 94 Master's, 5 Doctoral degrees • SFSU is a public research university • In 2012 the university was ranked as the 15th best master's-granting public university in the Western United States by U.S. News & World Report • Among 121 Western Universities, San Francisco State was ranked 6th in terms of campus diversity by U.S. News & World Report in 2013
San Diego State University	• Founded in 1897 • Forbes, Fortune and U.S. News & World Report rank it top 25 for entrepreneurship • More than 400,000 alumni family • 91 undergraduate majors, 76 master's programs and 23 doctoral degree programs • SDSU ranked No. 68 among public universities by U.S. News & World Report‘s annual rankings
California State University – Long Beach	• Founded in 1949 • 322-acre campus with 82 Bachelor's, 65 Master's, and four Doctoral degrees • Ranked the 19th top college in the United States by Pay scale and College Net’s Social Mobility Index college rankings • Ranked as one of the top five public master's degree-granting institutions in the West by U.S. News & World Report's "America's Best Colleges Guide" in every year's edition from 2005 to 2013
California State University – Fresno	• Founded in 1911 • The university enrolled more than 24,400 students for Fall16 • 2,334 full- and part-time; 96 percent of the tenured faculty hold doctoral or other terminal degrees in their areas of study

	• 388-acre main campus • The Daily Beast ranked Fresno State 143rd in the country out of the nearly 2000 schools it evaluated for its 2013 Best Colleges ranking
California State University – East Bay	• Founded in 1957 • 125,000 + alumni network • East Bay has been designated a top–tier institution among master's–granting universities in the west by U.S. News & World Report • California State University, East Bay offers 52 undergraduate and 39 Master's degree programs
California State University – Fullerton	• Founded in 1957 • 40,439 students enrolled for fall 2017 • 57 undergraduate, 52 graduate programs offered • Faculty members were awarded $26 million in grants and contracts for research and scholarly activities in 2016-17. • CSUF ranks among the nation's top 25 "Most Innovative Schools"- U.S. News & World Report
California State University – Sacramento	• Founded in 1947 • 300 acres campus with approximately 30,500 student enrolments annually • Alumni base of 215,000 • University offers 151 Bachelor's, 69 Master's degrees • The university was ranked the 15th most ethnically diverse campus of the West and the 21st most Economically Diverse campus in the Western Region with 57% of students receiving Pell Grants in 2012, according to U.S. News & World Report. • The campuses houses over 30 research centers
University of Redlands	• University of Redlands is a private institution that was founded in 1907 • Redlands offers more than 40 undergraduate majors and more than 10 for graduate students, including a two-year program in the Department of Communicative Disorders • Ranking is 16 in Regional Universities West&34 in Top Performers on Social Mobility • The College of Arts and Sciences (CAS)serves approximately 2,400 undergraduate students and 100 graduate students from 41 states and 28 countries

University	Research Key Points
University of California, Berkeley	• **During the 1940s, Berkeley physicist J. R. Oppenheimer, the "Father of the Atomic Bomb", led the Manhattan project to create the first atomic bomb.** • **Wireless 'pacemaker for the brain' could be new standard treatment for neurological disorders-** A new neuro stimulator developed by engineers at UC Berkeley can listen to and stimulate electric current in the brain at the same time, potentially delivering fine-tuned treatments to patients with diseases like epilepsy and Parkinson's. • **Researchers use jiggly Jell-O to make powerful new hydrogen fuel catalyst** A cheap and effective new catalyst developed by researchers at the University of California, Berkeley, can generate hydrogen fuel from water,To create the catalyst, the researchers followed a recipe nearly as simple as making Jell-O from a box. They mixed gelatin and a metal ion with water, and then let the mixture dry. • **New quantum materials could take computers beyond the semiconductor era** Researchers UC Berkeley are looking beyond current transistor technology and preparing the way for a new type of memory and logic circuit that could someday be in every computer on the planet. • **Skin-like sensor maps blood-oxygen levels anywhere in the body** A new flexible sensor developed by engineers at UC Berkeley can map blood-oxygen levels over large areas of skin, tissue and organs, potentially giving doctors a new way to monitor healing wounds in real time • **Berkeley engineers develop origami electronics from cheap, foldable paper** Using inexpensive materials, UC Berkeley engineers have fabricated foldable electronic switches and sensors directly onto paper, along with prototype generators, supercapacitors and other electronic devices.simply folding it could switch circuits on and off or otherwise change their activity — a kind of electronic origami. • **In desert trials, next-generation water harvester delivers fresh water from air** UC Berkeley in Arizona desert, plopped their newest prototype to suck water out of the air without any power other than sunlight. this next-generation harvester proved that the water harvester can extract drinkable water every day/night cycle at very low humidity and at low cost, making it ideal for people living in arid, water-starved areas of the world.

	• **New chip could lead to cheaper and better medical imaging devices and self-driving cars** Berkeley engineers have created the fastest silicon-based, programmable two-dimensional optical phased array, built on micro-electro-mechanical systems (MEMS). This chip could lead to cheaper and more efficient medical-imaging devices, optical communications and holographic televisions. It could also give rise to more robust light detection and ranging (LiDAR) sensors for self-driving cars • **Scientists map our underappreciated 'little brain'** Scientists at UC Berkeley have used brain imaging to map the cerebellum, a formerly underappreciated neural region that contains the vast majority of the brain's neurons, hence its Latin moniker "little brain."This is the first time the human cerebellum has been mapped using task-based data on the same set of subjects at this detail • **Four Berkeley satellites could be exploring Mars and Earth by 2022** two teams of scientists and engineers at UC Berkeley's Space Sciences Laboratory will be sending experiments into orbit around Mars and Earth by the end of 2022, each mission consisting of identical twin satellites. Last month, NASA announced that a mission comprised of two spacecraft, each carrying an identical suite of experiments, • **Squishy robots can drop from a helicopter and land safely** New soccer-ball-shaped robots, created by engineers at UC Berkeley, have the remarkable ability to fall from a height of more than 600 feet and be no worse for wear. they can also shapeshift in order to crawl from one point to another. Equipping the robots with sensors and dropping them into disaster zones could provide first responders with critical information about conditions on the ground,
University of California, Davis	• **Anti-Solar Cells: A Photovoltaic Cell That Works at Night** In fact, a specially designed photovoltaic cell could generate up to 50 watts in ideal conditions at night, developing prototypes of these nighttime solar cells that can generate small amounts of power. The researchers hope to improve the power output and efficiency of the devices. • **New Measurement of Hubble Constant Adds to Cosmic Mystery** New measurements of the rate of expansion of the universe, led by astronomers at the University of California, Davis, add to a growing mystery: Estimates of a fundamental constant made with different methods keep giving different results.It allows astronomers to figure out the size and age of the universe and the distances between objects.

	• **Melting the Protons** Team of Physics Professors and their team at UC davis are using the largest and most complex machine ever built to probe the strongest force in nature at the tiniest of scales.team is trying to recreate a state of matter that existed about a microsecond after the Big Bang," • **Crocker Nuclear Laboratory to Produce Rare Medical Isotope** The Crocker Nuclear Laboratory at the University of California, Davisto manufacture a rare isotope, astatine-211, for medical use. at the same magnets at the heart of UC Davis' 53-year old cyclotron were used to discover astatine almost 80 years ago • **Explore Secrets of the Universe in Spectacular IMAX Movie** Venture from the tiniest subatomic particles to the grand scale of the galaxies and step inside the biggest machine ever built in Secrets of the Universe, a new IMAX movie withe the help from Team of secints from UC Davis. Secrets of the Universe will have its global premiere at the Smithsonian National Air and Space Museum in Washington • **Metals Influence C-Peptide Hormone Related to Insulin** Metals such as zinc, copper and chromium bind to and influence a peptide involved in insulin production, according to new work from chemists at the University of California, Davis. The research is part of a new field of "metalloendocrinology" that takes a detailed look at the role of metals in biological processes in the body.A three years project innovative, early-stage, cutting-edge biomedical research with the potential to benefit children • **Computer Scientists Create Programmable Self-Assembling DNA** Computer scientists at the University of California, Davis, and the California Institute of Technology have created DNA molecules that can self-assemble into patterns essentially by running their own program • **New Cryo-Electron Microscope Powers Biological Sciences Discovery** A new era in structural biology is coming to UC Davis, and it is already yielding discoveries .It's called cryoelectron microscopy, or cryo-EM, and it allows biologists to capture three-dimensional movies of biological molecules down to the scale of single atoms • **Anti-Inflammatory Compound Protects Against Cancer Growth and Recurrence** A new anti-inflammatory compound developed at the University of California, Davis, acts as a "surge protector" to suppress inflammation and reduce cancer growth, at least in mouse models of cancer. • **Students Design Greenhouse for Mars**

	A student team from the UC Davis Space and Satellite Systems club was one of five university teams invited to present their plans for a Mars greenhouse at the NASA Langley Research Cente • **Gene Discovery May Halt Worldwide Wheat Epidemic** University of California, Davis, researchers have identified a gene that enables resistance to a new devastating strain of stem rust, a fungal disease that is hampering wheat production throughout Africa and Asia and threatening food security worldwide. Gene Can Help Fend off Devastating Strain of Stem Rust
University of California, Irvine	• **Driven for desalinization** UCI researchers are part of a national mission to create affordable water treatment solutions.examine the critical technical barriers and research needed to lower the energy cost of desalination and other water processing methods. Among the scholars participating is a team from UCI • **An improved implant** UCI researchers have developed a breakthrough cochlear device that could enable hearing-impaired people to detect pitch. The novel device, which would enable users to detect a range of pitches, is now undergoing efficacy and safety testing. • **UCI astronomers team confirm existence of exoplanet orbiting nearby star** A team of scientists – including UC Irvine astronomer Paul Robertson – has confirmed that an object previously detected by the Kepler space telescope is an exoplanet, a planet orbiting a star outside our solar system. • **Battling Brain Cancer on All Fronts** Neuro-oncologist UC Irvine pioneering work is improving outcomes for patients with the most aggressive form of the disease. ushed the boundaries of innovation in her quest to increase the survival rates of individuals with brain tumors, especially glioblastomas. The esteemed physician-scientist has taken a truly comprehensive approach to battling this rare disease, which has a five year survival rate of only 10 percent • **Beating Cancer – One Patient at a Time** At UCI, the combination of research, evidence-based treatment and ongoing training results in state-of-the-art care. AI enhances your comfort level, and it helps reassure you that you're getting the best care possible. this program uses artificial intelligence to make screening easier and more accurate • **Exoplanet hunting instrument created by UCI astronomer makes first observations**

	Team of UCI astronomer recently celebrated "first light" for NEID, a new exoplanet hunting instrument they helped develop. Installed at the 3.5-meter WIYN telescope at Kitt Peak National Observatory in Arizona's Sonoran Desert, NEID is an extremely precise radial velocity spectrometer. Its initial observations were of 51 Pegasi, Exoplanets discovered with NEID will help identify targets for follow-up observations with upcoming facilities • **UCI engineering team creates biocatalyst for microbial production of useful commodities** Scientists have demonstrated that – in labs – microbes can be used as tiny biological factories to produce fuels, pharmaceutical drugs and other commodities from renewable resources. But achieving output on a commercially viable scale has proven elusive. A key barrier has been so-called cofactors – biocatalysts that spur enzymatic activity in cells – as these molecules are both expensive and difficult to manipulate • **UCI data scientists use geometric concept to spot strong, weak points in neural networks** Researchers at UCI and other institutions employed an abstract geometric concept known as "network curvature" to elucidate the conduits between isolated regions of the brain. The project enabled the identification of important nodes that contribute to the brain's overall robustness and ability – or inability – to overcome injuries, strokes or congenital defects. • **UCI, other researchers develop deep-learning technique to ID at-risk anatomy in CT scans** UCI computer scientists and researchers from other institutions have developed an automated technique to perform this function using a deep-learning algorithm. Using this model, it's possible to delineate an entire scan in a few seconds, a task that would take a human expert over half an hour. • **Astronomers from UCI and Texas A&M peer into distant black hole's 'sphere of influence'** Astronomers at UCI and Texas A&M University have obtained the most detailed view yet of an inner cold gas disk around a distant supermassive black hole. Studying the giant elliptical galaxy with a powerful radio telescope array in the high desert of northern Chile – the scientists were able to clearly resolve the rapid rotation of gas around its supermassive black hole • **UCI electrical engineering team develops 'beyond 5G' wireless transceiver** A new wireless transceiver invented by electrical engineers at the University of California, Irvine boosts radio frequencies into 100-gigahertz territory, quadruple the speed of the upcoming 5G, or fifth-generation, wireless communications standard. ovel architecture enables ultra-fast data processing, less energy consumption

	• **UCI team pioneers cancer treatment that targets bone metastases while sparing bone** New, safer approach using engineered stem cells could reduce need for chemotherapy. University of California, Irvine researchers have developed and tested on mice a therapeutic treatment that uses engineered stem cells to target and kill cancer bone metastases while preserving the bone.
University of California, Los Angels	• UCLA-led research team produces most accurate 3D images of '2D materials' A UCLA-led research team has produced in unprecedented detail experimental three-dimensional maps of the atoms in a so-called 2D material — matter that isn't truly two-dimensional but is nearly flat because it's arranged in extremely thin layers, no more than a few atoms thick.Scientists develop innovative technique to pinpoint coordinates of single atoms • **New optical system could lead to devices that can recognize objects instantly** A technology developed at the UCLA Samueli School of Engineering could one day make it possible to produce optical devices that can instantaneously recognize objects without additional computer processing. The technology could ultimately be useful for robots, autonomous vehicles and other applications. • **UCLA researchers discover new compound that promotes lung health** A molecule identified by UCLA researchers helps maintain a healthy balance of cells in airway and lung tissue. If the compound, so far only studied in isolated human and mouse cells, has the same effect in people, it may lead to new drugs to treat or prevent lung cancer. Molecule helps maintain a balance between stem cells and mature airway cells • **Botanical drug is shown to help patients with head and neck cancers** In a UCLA-led phase I clinical trial, a new plant-based drug called APG-157 showed signs of helping patients fight oral and oropharyngeal cancers. These cancers are located in the head and the neck. UCLA Jonsson Comprehensive Cancer Center researchers found that treatment with this botanical drug resulted in high concentrations of curcumin and its byproducts circulating in the blood and absorbed by tumor tissues within three hours after being taken orally. • **Researchers identify possible new combination treatment for advanced melanoma** A study by researchers at the UCLA Jonsson Comprehensive Cancer Center suggests that using an immunotherapy drug called NKTR-214, in combination with an infusion of anti-tumor immune cells, or T cells, may produce a stronger immune response that could help fight advanced melanoma.

	• **Astronomers discover class of strange objects near our galaxy's enormous black hole** Astronomers from UCLA's Galactic Center Orbits Initiative have discovered a new class of bizarre objects at the center of our galaxy, not far from the supermassive black hole called Sagittarius A*. These objects look like gas and behave like stars • **Researchers create accurate model of organ scarring using stem cells in a lab** Team at ucla has developed a "scar in a dish" model that uses multiple types of cells derived from human stem cells to closely mimic the progressive scarring that occurs in human organs. The researchers used this model to identify a drug candidate that stopped the progression of and even reversed fibrosis in animal models • **New MRI may help doctors differentiate causes of memory loss** A UCLA-led study has found that MRI scans can help doctors distinguish whether a person's memory loss is being caused by Alzheimer's disease or by traumatic brain injury. Identifying distinct characteristics of dementia caused by brain injury could prevent misdiagnosis of Alzheimer's • **UCLA astronomer gets best look at first comet from outside our solar system** A UCLA professor of planetary science and astronomy with his team, has captured the best and sharpest look at a comet from outside of our solar system that recently barged into our own. It is the first interstellar comet astronomers have observed. using NASA's Hubble Space Telescope, which captured images of the object when it was about 260 million miles away. He observed a central concentration of dust around the comet's solid icy nucleus. • **Hydrogel could be step forward in therapies to generate bones in head and neck** A team of UCLA School of Dentistry researchers has developed the first adhesive hydrogel specifically to regenerate bone and tissue defects following head and neck surgeries. Their invention was inspired in part by the way that marine mussels can stick to wet surfaces. UCLA invention was inspired in part by mussels' ability to stick to wet surfaces • **Researchers identify molecular process that could accelerate recovery from nerve injuries** Researchers at Stem Cell Research at UCLA have discovered a molecular process that controls the rate at which nerves grow both during embryonic development and recovery from injury throughout life. used experiments with mice to show that it is possible to accelerate peripheral nerve growth by manipulating this molecular process. The finding could inform the development of therapies that reduce the time it takes for people to recover from nerve injuries.

University of California, San Diego	• **Supercomputers Unlock Reproductive Mysteries of Viruses and Life** Viruses rely on the host cell membrane to drastically bend and eventually let loose the replicated viruses trapped inside the cell. Scientists recently used supercomputer simulations to help propose a mechanism for this budding off of viruses. a related study also relied on supercomputer simulations to find a mechanism for how the DNA of all life adds a base to its growing strand during replication. • **Researchers Tackle the Flu with Breakthrough Virus Simulations** A team of researchers from the University of California San Diego and the University of Pittsburgh offers a new approach for developing treatments for influenza. researchers broke new ground with their simulations in terms of size, complexity and methodological analyses of the simulated components. • **Researchers Develop Framework that Improves Firefox Security** Researchers from the University of California San Diego,Stanford University and Mozilla have developed a new framework to improve web browser security. The framework, called RLBox, has been integrated into Firefox to complement its other security-hardening efforts. Computer scientists develop a technique to protect browsers from buggy third-party libraries • **Microsized Bacterial Bait Could Provide New Treatment for Infections** Nano engineers at the University of California San Diego have developed a "microtrap" that zips around in an acidic environment (like that found in the stomach) and serves as a toxic bait for E. coli bacteria. this concept work addresses a common medical issue that most drugs get diluted in body fluids before they can do their job • **New Injection Technique May Boost Spinal Cord Injury Repair Efforts** An international research team, led by physician-scientists at University of California San Diego School of Medicine, describe a new method for delivering neural precursor cells (NSCs) to spinal cord injuries, reducing the risk of further injury and boosting the propagation of potentially reparative cells.,method reduced likelihood of further spinal cord trauma while delivering large doses of potentially reparative stem cells; • **Supercomputer Simulations Reveal Details of Galaxy Clusters** Astrophysicists at UC San Diego have developed cosmological computer simulations called RomulusC. With a focus on black hole physics, RomulusC has produced some of the highest resolution simulations ever of galaxy clusters, which can contain hundreds or even thousands of galaxies. Scientists probe the intracluster medium that is invisible to optical telescopes • **'Spillway' for Electrons Could Keep Lithium Metal Batteries from Catching Fire** Nanoengineers at the University of California San Diego developed a safety feature that prevents lithium metal batteries from rapidly heating up and catching fire in case of an internal short circuit.

	• **Scientists Design Way to Use Harmless Bacteria to Detect Heavy Metals in Drinking Water** When it comes to testing drinking water for dangerous contaminants, such as heavy metals like lead or cadmium, continuous testing directly from faucets people drink from is important. Yet, very little of this kind of water testing is done. A team from UC San Diego is working to improve the situation by new approach to continuous monitoring of heavy metal contamination in drinking water using bacteria as sensors of contamination • **Leukemia Drug Shows Promise for Treating a Childhood Brain Cancer** Team of researchers at University of California San Diego. In the study, the team demonstrated how use of a single drug, specifically targets cancer cells that have an abnormal activation of a cell communication system, called the Hedgehog pathway, via two different mechanisms, making it more effective and less toxic than combining drugs. • **Artificial Intelligence Tool Predicts Life Expectancy in Heart Failure Patients** a diverse team of cardiologists and physicists from University of California San Diego, developed a machine learning algorithm based on de-identified electronic health records data of 5,822 hospitalized or ambulatory patients with heart failure at UC San Diego Health.Algorithm developed by physicists and cardiologists achieved 88 percent success rate
University of California, Santa Barbara	• **Soft Robot, Unplugged** A new, human-scale soft robot can move untethered and navigate human environments Developed by researchers in UC Santa Barbara, it's also a major step in the effort to bring soft robots to human environments, where their characteristics are uniquely suited for interaction with and around people. • **Snapping A Space Shot** UC Santa Barbara team s is now building the instruments to directly image exoplanets using a powerful new kind of superconducting photon sensor developed in UC Santa Barbara , and has integrated these detectors with the 8-meter Subaru Telescope in Hawaii. direct imaging will enable scientists to investigate the chemical composition of exoplanets' atmospheres using spectroscopy • **Peering Inside the Black Box** Untangling how artificial intelligence thinks can shed light on our own notions and ideas. this project is focused in unraveling how these brain-like systems think, and it is providing unexpected insights into our own way of understanding the world. • **Old Molecule, New Tricks** Old compounds have come back into vogue with a wide range of applications, from medicine to nanoscale engineering.Teams led by

	fellow UCSB chemistry professor, carboranes could hold the key to more efficient uranium extraction.team developed an electrochemical method for extracting uranium and, potentially, other metal ions from the solution • **Ushering in a New Quantum Era** A group of UC Santa Barbara scientists in 2019 made history with a demonstration of quantum supremacy — the first quantum computer with the ability to surpass even the most powerful classical supercomputer in the world. Under the guidance of UCSB, the group achieved what just a year earlier had been an ambitious plan, fraught, as many lofty goals are, with unforeseen difficulties and unexpected hurdles. • **How Stem Cells Make Decisions** Neuroscientist at UCSB and his research group as they investigate how undifferentiated stem cells take their paths to becoming the specific tissues that comprise the human body, particularly those that become neural precursors. • **A Massive Star's Dying Breaths** Researchers at UC Santa Barbara have made predictions about the brightness of the supernova that would result when a pulsating star like Betelgeuse explodes. Physicists model the supernovae that result from pulsating supergiants.the aim was to know what it looks like if a pulsating star explodes at different phases of pulsation • **Star Light, Star Bright** Scientists discover a new type of pulsating star. A team of scientists led by UC Santa Barbara researchers recently discovered a new class of these pulsators that vary in brightness every five minutes • **On the Hunt for Gravitons** Physicist proposes a new approach in the search for the elusive graviton. UC Santa Barbara physics investigating gravity interacting with electromagnetism from a quantum field theory perspective. The study suggests new directions to explore for clues about how gravity works at the quantum scale, focusing on the behavior of the dense cloud of gravitons that appears near a violent event in space, such as a black hole merger. Some of the gravitons can then transform themselves into very long wave radio waves of possible detectability in the vicinity of Earth. • **A Virtual Connection** Researchers study virtual reality's potential for bringing together older adults and their children. a group of researchers and entrepreneurs, including UC Santa Barbara professors are bringing VR to assisted living facilities, harnessing its power in a profound way. it might help residents, particularly those experiencing cognitive decline, stay in better touch with their families. • **Brain on Fire**

	Scientist at UC Santa Barbara helps develop animal model for one type of encephalitis, a damaging brain disease. With that information, researchers could specifically block the damaging autoimmune reaction and test new therapeutic strategies using their newly developed mouse model for the disease.The goal is a cure that is specific to this disease
University of California, Riverside	• **Making 'soft' robots work harder** A new robot developed at UC Riverside can navigate uneven surfaces with silicone legs. Researchers at the University of California, Riverside, are trying to make robots more adaptive and safer for humans to interact with by developing soft robotic legs that respond to surfaces more naturally. mechanical intelligence" onto the artificial decision-making algorithms that animate most robots, the researchers are building robots that are better able to navigate different environments • **How a virus forms its symmetric shells** UC Riverside-led study could inform the design of engineered nano-shells used in drug delivery. A research team led by physicists at the University of California reports that an interplay of energies at the molecular level makes the formation of a shell possible. • **Quantum leap for quantum computing** UC Riverside will lead collaborative effort at developing scalable quantum computers. Quantum computers are expected to greatly outperform the most powerful conventional computers on certain tasks, such as modeling complex chemical processes, finding large prime numbers, and designing new molecules that have applications in medicine. • **Early intervention following traumatic brain injury reduces epilepsy risk** UC Riverside-led study finds an immune receptor in the hippocampus is responsible for the onset of the disease after brain injuries. A research team led by a scientist at the University of California, Riverside, has found that brains treated with certain drugs within a few days of an injury have a dramatically reduced risk of developing epilepsy later in life. • **E-cigarette users are exposed to potentially harmful levels of metal linked to DNA damage** Zinc excess in the body correlates with oxidative stress. Researchers at the University of California, Riverside, have completed a cross-sectional human study that compares biomarkers and metal concentrations in the urine of e-cigarette users, nonsmokers, and cigarette smokers. • **New research shows how the malaria parasite grows and multiplies** Study co-led by UC Riverside scientist could help develop strategies to combat the disease. Scientists have made a major breakthrough in understanding how the parasite that causes malaria is able to multiply

	at such an alarming rate, which could be a vital clue in discovering how it has evolved and how it can be stopped. For the first time, scientists have shown how certain molecules play an essential role in the rapid reproduction of parasite cells and cause this deadly disease. • **Astronomers discover unusual monster galaxy in the very early universe** An international team of astronomers led by scientists at the University of California, Riverside, has found an unusual monster galaxy that existed about 12 billion years ago, when the universe was only 1.8 billion years old. • **Scientists develop new method to detect oxygen on exoplanets** UC Riverside helped develop the new technique, which will use NASA's James Webb Space Telescope to detect a strong signal that oxygen molecules produce when they collide. This signal could help scientists distinguish between living and nonliving planets, Technique could speed search for life in outer space. • **Gamma-ray laser moves a step closer to reality** Calculations by UC Riverside's Allen Mills predict metastable positronium bubbles in liquid helium. A physicist at the University of California, Riverside, has performed calculations showing hollow spherical bubbles filled with a gas of positronium atoms are stable in liquid helium. The calculations take scientists a step closer to realizing a gamma-ray laser, which may have applications in medical imaging, spacecraft propulsion, and cancer treatment. • **Making higher-energy light to fight cancer** Researchers use nontoxic silicon nanocrystals to convert low-energy photons into high-energy ones, bringing scientists closer to developing photodynamic treatments for cancer. The advance could also hasten new technologies for solar-energy conversion, quantum information, and near-infrared driven photocatalysis
University of Southern California	• **Could This Nearly Invincible Drone Be the Future of Disaster Relief?** A new artificially intelligent drone control system, designed by USC researchers, allows drones to withstand pushing, kicking and even colliding with objects. Drones, specifically quadcopters, are an adaptable lot. They've been used to assess damage after disasters, deliver ropes and life-jackets in areas too dangerous for ground-based rescuers, survey buildings on fire and deliver medical specimens. • **A Future Sound "Computer"** USC researchers create smart materials that can mimic electrical devices by triggering different responses to sound. A team of USC researchers created a new smart material that accommodates shifts in acoustic transmission on demand. "With traditional acoustic metamaterials, you create one structure and you achieve one property. With this new smart material, we can achieve multiple properties with just one structure

- **Certain combinations of cardiovascular drugs may reduce dementia risk**
  In a first, a USC study has shown that drugs already being used for blood pressure and cholesterol control could provide benefits for Alzheimer's and other dementias. research found dementia risk may be reduced with a specific combinations of drug treatments for vascular health. Specific combinations of statins and antihypertensives may also reduce risk for Alzheimer's disease, according to a new USC study of nearly 700,000 Medicare beneficiaries.

- **New Nanoparticle Can Turn Carbon Emissions Into Fuel, Sustainably**
  Researchers at USC School of Engineering are working to bring this closer to reality. The team has discovered a metal carbide nanoparticle (a compound of carbon and metal) that can convert CO2 into fuel; a particle that for the first time, can be produced sustainably at low temperature.

- **From detecting lung cancer to spotting counterfeit money, this new imaging technology could have countless uses**
  The newly developed method is called SEER, which USC researchers say works up to 67 times faster and provides far greater definition than current techniques. Scientists affiliated with the USC have been working on the technology for the past few years. The technique focuses on the building blocks of biology.

- **Germ warfare between bacteria and viruses is a standoff**
  USC marine biologists have found that the endless struggle between viruses and bacteria ends in a stalemate, scientific proof of the evolutionary principle known as the "Red Queen." biologists completed a comprehensive new study that shows the tactics bacteria and viruses employ to gain advantages against each other

- **Showing Robots "Tough Love" Helps them Succeed, Finds New USC Study**
  Humans acting in an adversarial manner towards robotic systems can actually improve their robustness, says a team of USC computer scientists. This is the first robot learning effort using adversarial human users. to help a robot succeed, you might need to show it some tough love. In a computer-simulated manipulation task

- **USC researchers discover how to reprogram cells, potentially unlocking new treatments**
  The technique involves uncoiling twisty DNA molecules, and it could have a major impact on understanding disease development at a cellular level. The researchers figured out how to reprogram cells to switch their identity much more reliably than present capabilities allow. The technique uses enzymes to untangle reprogramming DNA, somewhat similar to how a coiffeur conditions tangled hair. "This is a strategy for greatly improving our ability to perform cellular reprogramming,

	• **Raising A.I.** Team of researchers at USC are looking to the most accomplished learning system nature has ever created: the human brain. This is where positive reinforcement comes into play. Brains, unlike computers, are analog learners and biological memory has persistence. Since the initial deep learning revolution, the goals and progress of deep-learning based AI as we know it has been very slow • **This new discovery could allow dentists to regenerate the roots of teeth** Team at USC have discovered how genes for the roots of teeth turn on and off, a key step on the path to someday regrowing the teeth themselves. team discovered that epigenetic regulation can control tooth root patterning and development. The goal: To someday regrow teeth, for which we first have to regenerate the roots
San Jose State University	• **The Challenge of Electroforming** Electroforming is the electro-deposition of copper on a non-metallic substrate. Challenge new team of students researchers to experiment with the age-old process, which uses an acid solution to plate objects with copper using electricity. a new way to problem-solve, forces us to look at what we do every day differently and really engage the creative mind in a new way • **"Eyes" Wide Open** Researchs involved a sensor where people could place their fingerprints. they coded the software such that the machine would scan each unique print, map out a three-dimensional image of the print's. nside a darkened gallery, patrons are invited to step up to a machine where they can scan their eyes and watch as software projects a three-dimensional image of their iris on the wall, pairing it with a sound that corresponds to the colors in their eyes. The installation, called "Eyes," was first designed by SJSU Assistant Professor in 2018 • **Addressing Inequities in Early Childhood Education** There's a science behind early childhood care and education. Team at SJSU are building empirical evidence in support of certain kinds of caregiving and educational instructional techniques—fields that are not often recognized. Research involves one-on-one interactions with children and explores how they learn numbers. Team also advises doctoral students who want to collaborate with lawmakers focused on early childhood education (ECE) policy • **A Gain for Hearing Loss** Graduates researchers will get the chance to work in an inter-professional team approach to patient care among infants, toddlers, children, adults and elder. team will be working with people encountering hearing loss due to their work environment, testing newborns within minutes of birth or treating the elderly, they will be working to improve others' quality of life.

- **Geology from the Ground Up**
  By understanding when and how land forms shift, fracture and change over time, she can gather data that helps evaluate earthquake hazard —data that may someday help keep communities safe. By this project How do geologists measure seismicity and communicate earthquake risk to the communities that could one day be affected. y decoding a rock's chemical properties and history of movement, geologists not only contribute to scientific discoveries

- **Solving DNA Puzzles, One Worm at a Time**
  If you want to cure a disease, you have to understand the underlying biology. team explores how the nervous system is formed and how potential genetic misfires may cause diseases such as autism and schizophrenia. understanding how synapses form and how they are modified during learning and memory will help scientists pinpoint what causes autism, schizophrenia and forms of dementia, thus making it possible to intervene, treat and possibly cure them.

- **Marc Slattery's Research Under the Sea**
  Marc Slattery's research has taken him to Antarctica, the Caribbean and across the Pacific, where he dives into depths up to 400 feet to examine coral reefs. Once underwater, there is no shortage of research questions to explore. A lot of the organisms that the team interested in are attached to the ocean bottom, Many have unusual chemistry to fight off predators, competitors and pathogens—their version of an immune system. Working from SJSU, team is interested in the chemistry that marine animals produce. to find how can we use that to our benefit?

- Since 2014, SJSU has operated the Silicon Valley Big Data and Cybersecurity Center (BDCC). The center serves as a cybersecurity research and knowledge hub by creating multidisciplinary collaborations between faculty members from across the university and Silicon Valley tech companies.

- In 2012, the NASA Ames Research Center in Mountain View, California, awarded SJSU $73.3 million to participate in the development of systems for improving the safety and efficiency of air and space travel. NASA scientists, along with SJSU faculty members and graduate students, will collaborate on this effort.

- On July 21, 2012, SJSU launched its first miniaturized satellite used for space research, TechEdSat, in a partnership with the NASA Ames Research Center.

- In spring 2007, an SJSU engineering professor and his students made headlines with their development of the ZEM (Zero EMissions) Car.

San Francisco State University	• **New Case study suggests gut bacteria can boost athletic performance** San Francisco State Professor of Kinesiology and his team conducted a case study to understand how the human microbiome — the ecosystem of living things such as bacteria found in and on the body — correlates to exercise and health. For his study, Bagley monitored the bacteria levels in a world-class ultramarathoner's gut before and after the runner. the result calim There are about five pounds of bacteria in your gut, with trillions of cells, Without whom, we would not function." • **Education experts are changing science from the inside out** San Francisco State University Professor of Biology and five of her colleagues across the CSU noticed a little-reported phenomenon: education specialists in science departments. "The practice of embedding people who have scientific backgrounds but who also bring expertise in education was an emerging idea,". There's a long history of science departments working with education departments, but this was something different. To learn more about the shift, the team surveyed faculty members across the 23 CSU campuses and published their results in 2008. in 2019 The researchers found that the number of education specialists in CSU science departments had increased by more than 50% since 2008, and the percentage who were formally trained in science education more than doubled • **SF State marine science in the spotlight** This project focus on how increasingly frequent and severe heat waves may threaten the aggregating anemone (Anthopleura elegantissima). Like corals, these "elegant and colorful masses of tentacles, Finding solutions to these varied threats facing our marine ecosystems is a high priority at the EOS Center, and environmental monitoring and restoration are critical tools in this process. • **Studying a city that appears out of thin air** Every year 70,000 people will converge on a remote location in Nevada, transforming a dry lakebed into a bustling city only to take it all apart just over a week later. For San Francisco State University Professor of Geography & Environment, it's a natural laboratory.But it wasn't the free-spirited atmosphere that caught teams attention. "They started describing how the city just evolves out of nothing, Largely lacking cars, the city's transportation sector made up an unusually small proportion of its carbon output. And the carbon dioxide breathed out by its dense population of attendees made up as much of 10% of the city's carbon emissions. "That value was higher during the peak of the festival than the transportation sector. "That's going to be the only city in the world where that's true. • **International pollinator study first of its kind to incorporate indigenous knowledge** "If we're going to solve problems, we want to use as much knowledge as we can. "This is the first time that an intergovernmental panel has made a concerted effort to use indigenous and local knowledge, and I think it sets a new standard for science and for inclusion." this study

	highlights the cultural relationships and unique knowledge that different cultures have about their local pollinators. • **Students combine science and social consciousness** The SF BUILD Scholar program aims to give socially conscious students the resources to do research that connects to their community, from coming up with a research idea and doing the experiment to getting the word out about what they discover. Last summer, the students spent nine weeks in a research training program. Now they've taken the next step by finding spots in research labs at San Francisco State and UCSF. • **Pain to gain** Most pain has a function, to understand how injuries and levels of the brain chemical serotonin combine to influence how the invertebrates learn. which causes more serotonin to be available in the brain, might make it harder for cuttlefish to learn to avoid painful stimuli. In the end, teams results were useful to apply to human health
San Diego State University	• **Astronomers Pinpoint Two New Double-Star Planetary Systems** Astronomers announced the first discovery of a two-star planetary system. Led by researchers at San Diego State University, with other collaborators, the telescope satellite's finding marks the start of a much better understanding of such planetary systems. • **Climate Data at Your Fingertips** A web tool developed by SDSU researchers offers instant access to global climate data. this web-based tool – four-dimensional visual delivery or 4DVD - that offers convenient, open access to climate data for regions across the world. Intended to be used for education and research, professionals and amateurs interested in climate science can search for and view data and visuals instantly with a few clicks • **Deep Brain Stimulation Safer for Patients with New MRI Compatible Electrode** A promising improvement to the procedure developed by San Diego State University engineers, in collaboration with other researchers . The SDSU research team created a glassy carbon electrode as an alternative to the metal version, and new findings show it does not react to MRI scans, making it safer. their product will last longer than metal when embedded in the brain of patients with Parkinson's and tremors, and won't be affected by MRI. • **What Caused Boeing's 737 Max Crashes** A Team of Diego State University engineers reported that, it appears that the sensor sent wrong information to the flight control system indicating the angle of attack is too large and approaching stall, so the system steered the aircraft by pitching the nose down to correct the angle of attack, "The pilots realized this was a wrong command and they tried to override the system, but it appears they could not figure out how to override it. So the planes went into a dive and eventually crashed.

	• **The Quest to Cure Cancer** In a new study The San Diego State University chemistry professor and her team, studies how enzymes, the protein workhorses of human cells, go rogue in ways that lead to cancer. Unlocking the relationship between enzymes and cancer could help researchers develop new treatments for patients • **Astronomers Discover Third Planet in the Kepler** A team of researchers, led by astronomers at San Diego State University, detected the new Neptune-to-Saturn-size planet orbiting between two previously known planets. Astronomers have discovered a third planet in the Kepler-47 system, securing the system's title as the most interesting of the binary-star worlds • **SDSU Discovery May Lower Cost of Making Pharmaceuticals** A San Diego State University chemistry professor has made a discovery that could one day lower the cost of hundreds of prescription medications. professor and his team of student researchers have discovered that a hybrid material, perovskite, can be used as a catalyst to spur the chemical reactions necessary to make pharmaceutical drugs. The material, previously used primarily for solar power cells, is exponentially cheaper and more efficient than other catalysts used in drug synthesis. • **Common Foods Can Help 'Landscape' the Jungle of Our Gut Microbiome** San Diego State University researchers have found a new way to harness food as medicine, which has far-reaching implications to control harmful microbes in our gut while balancing microbial diversity by fostering the growth of beneficial bacteria. The ability to kill specific bacteria, without affecting others, makes these projects very interesting
California State University Sacramento	• **Sac State prof helps plumb ocean depths for climate clues** The ocean speaks volumes to scientists like Sacramento State's professor of geology, and scientists, At its surface, it offers information about the health of our planet. On its floor, it reveals glimpses of the distant past. Studies already suggest that climate change, most likely spurred by human activity, is affecting the world's oceans. A study found that ocean warming is accelerating faster than previously thought, with dire implications. Escalating water temperatures have been blamed for killing marine ecosystems, raising sea levels and making hurricanes more destructive. • **Teacher and students seek keys to mental illness** Research focus on What was the molecular basis of brain diseases such as bipolar disorder, the effects of which claimed a young life who seemed to have such a bright futures. research laboratory uses the common fruit fly as a model organism to study how genes and environmental factors may converge to cause neuro developmental disorders including autism and Fragile X syndrome. which supports

	student biotechnology research throughout the California State University system. • **New labs project** The Bauer lab is investigating the influence of extrinsic, or environmental, factors on metabolic homeostasis, molecular damage and gene expression. In particular, the lab has shown that changing the activity of enzymes involved in fatty acid metabolism is sufficient to alter fly behavior and longevity. These findings suggest a link between life span and behavior • **Matireal Research** Research is focused upon utilizing solid state NMR, X-ray diffraction, and IR spectroscopy to formulate an understanding of structure-function relationships and diffusion processes in porous materials and geologic systems. Development and testing of environmental remediation materials • **New cure to an old issue** research interests involve the development of new delivery vehicles and targeting strategies of known inhibitors of HIV. The goal of these projects is to increase the selectivity of a drug for the virus-infected cells, and also to improve the antiviral action of moderately active compounds. • **computer-assisted drug discovery** research interests are in the area of computer-assisted drug discovery. My group uses a combination of experimental and computational methodologies to gain an understanding of how small bioactive molecules interact with their protein receptors. The ultimate goal is the design of novel molecules with improved bioactivities. Several enzymes are currently targeted, including calcium ATPases, the sodium/potassium ATPase, xanthine oxidase, the aryl hydrocarbon receptor, and dynamin • **Venerable technology tracks Earth's spin in Science Complex** The Foucault pendulum was the first-ever direct evidence that the Earth spins on its axis, “People were pretty sure for hundreds of years that the Earth was spinning but couldn’t prove it, because it looked like the sky was moving around them. • **Projects aim to boost millennials interest in computer science** millennials, especially from poor background, continue to be underrepresented in computer science. But two new Sacramento State projects aim to change that by considering how the education system can better support millennials interested in computer careers. to find ways to encourage more millennials to enter the field and recruit millennials into teacher-preparation programs.
California State University Long Beach	• **Improving Human Performance via Biomechanics, Robotics, Virtual Reality and More!**

	Project is designing a full-body suit that tracks human motion and muscle activity, while providing motion-optimizing feedback. The purpose of this project is to create a suit that can be used in possible applications such as: correcting posture while walking or running, providing guidance for blind people, and rehabilitation. project is can also be uses as a generic, multibody simulation framework that can track and analyze human motion in real-time • **New Engineering Designs in Road Pavement Can Significantly Reduce Pollution Runoff to Ocean** Permeable pavements may be an alternative low impact development (LID) and/or best management practice (BMP) design for the storm water management. The quality of the permeable pavement depends on the design specifications, construction and maintenance practices. A location was selected within CSULB for the construction of the test sections. Pressure cells and strain gauges were installed during the construction of pavement for measuring the stress on top of the subgrade and strain at the bottom of surface layer on both test sections to assess the performance of the fully permeable pavement. • **Soil-Structure Interaction and Geotechnical Earthquake Engineering** The research projects that are been developing at CSULB revolve around the integration of full-scale numerical simulations with real field monitoring data, laboratory data, and in situ testing to gain a deeper understanding of observed soil and structural behavior. a team of undergraduate and graduate students are studying the liquefaction potential of the hydraulic fills that constitute most of the subsurface at the Port of Long Beach. Geotechnical field and laboratory tests are being used to calibrate advanced constitutive soil models. • **Improving Mental Health Outcomes in At-Risk Young Adults** A study that broadly examines how psychosocial and physiological factors influence mental health outcomes. Results from this study will provide pilot data for larger grant applications focused on testing computerized interventions that improve anxiety (Gonzalez) and using engineering technology sensors that help provide immediate cortisol results to identify abnormal stress levels in at-risk populations. • **Preventing one of the Most Dangerous Infections in Newborns** Nursing student's research examines how Neonatal Intensive Care Units can prevent blood stream infections stemming from central line catheters in newborns. NICU Quality Improvement (QI) programs across the nation have been successful in reducing the incidence of central line-associated infections. this project reviews the effect of a QI project on central line infections and identifies key factors associated with sustained low infection rates in the NICU • **Student's Research on Nanotechnology** Research that may lead to better alternatives to chemotherapy and radiation therapy in the treatment of cancers. research on nanotechnology, an emerging technology that has a potential of

	revolutionizing the current scientific fields. this research involves combining a type of blood plasma protein that mediates cholesterol transport in the body and can have an effect on killing cancer cells through a process that would simply expose them to infrared light and intracellular temperature • **The Future of Flight Safety** To conduct research on future flight management concepts, like single pilot operations and the integration of drones into the National Airspace System. They look at how pilots and air traffic controllers perform when faced with different situations like extreme weather, the closure of an airport and an increase in air traffic. team of students researches run through a variety of scenarios using unique simulators that are connected with scientists at the NASA Ames Research Center • **Discovered Cache of Rare Ancient Bronze Coins Date to Early Roman Empire** CSU Long Beach Professor of Classics Paul Scotton, along with an excavation team, has unearthed a significant cache of bronze Roman coins buried under a collapsed building about 1,500 years ago in the ancient Greek city of Corinth during an earthquake and tsunami, which also destroyed a once bustling harbor. Also discovered were two large Roman civic basilicas, popular public buildings at that time.
California State University Fresno	• **Saving road side life** Geomatics engineer Riadh Munjy is helping to save the lives of surveyors who work on California highways. CSU Fresno stepped up its efforts to minimize dangers faced by its employees. fellow Fresno State professor Mushtaq Hussain to find solutions that would increase roadside safety. Team's specialty is digital mapping, a technology that can be used to gather surveying information from airplanes, lifting the burden – and some of the danger • **A New beghing** Teams researches is concentrated on system modeling, automation and control. An electrical and computer engineering professor, his team of researches are developing mathematical models for energy, thermal testing and robotic systems. He utilizes the developed models in the design of sliding mode and fuzzy logic control methodologies that ensure a robust performance and efficient system automation. As a visiting researcher at NASA's Dryden Flight Research Laboratory, worked on the modeling and control of a temperature test system for materials used in aerospace applications. • **Leading air quality research** initial this research focused on the potential impact that applied fertilizers and pesticides have on agricultural groundwater quality. But team work shifted focus to air quality when he initiated a research project with NASA's Ames Research Center to quantify ammonia gas emissions as a source of pollution from fields following application of nitrogen-based fertilizers. Ultimately team hopes that by researching

	the source of these emissions, producers and regulators can find ways to translate that knowledge into new technologies and production practices for dairies that will have a beneficial impact on air quality • **MAPPING A PATHWAY TO INCREASE BILINGUAL TEACHERS IN THE VALLEY** Project aims to develop a clear pathway for asspering teacher to reach their educational and career goals. this project led by a young team of researchs from CSU Fresno is going to have a huge impact, primarily on school districts with a teacher shortage. Currently, there are so many school districts that have teachers on an emergency credential. So to actually have fully-credentialed educators go into the classroom, that is going to make a world of difference, especially for our students. • **FRESNO STATE RECEIVES FOUR NEW PATENTS FOR DROUGHT-TOLERANT PLANTS** Fresno State received four new patents for cultivated varieties of cactus plants that can be grown in areas of the Valley with high selenium levels and limited access to quality water. These selected cactus pear cultivars produce delicious fruit and cladodes with moderate levels of selenium and will prove vital in developing alternative crops to tolerate drought conditions in this economically hard hit area • **how to increase domestic consumption and access to, locally and regionally produced agricultural products, and to develop new market opportunities** The focus of this initiative by CSU Fresno, is to build local producer-to-consumer food outlets that will, among other things, facilitate access to fresh fruits and vegetables for residents of disadvantaged food desert communities. Activities will include farmers' market manager training, public health compliance training for prospective vendors, cottage food operation training for local entrepreneurs, and implementation of farmers' market promotional plans • **New project to expand interdisciplinary education for Fresno State's STEM** An integrated research and education project aimed at determining how animals navigate in complex environments. The ultimate goal of this project is to advance the understanding of the perceptual, learning and memory mechanisms underlying navigation.The project is focused on providing new learning and research opportunities to expand interdisciplinary education for Fresno State's STEM (science, technology, engineering and mathematics) majors.
California State University East Bay	• **Eyes on the Sky** Cal State East Bay students, professor part of team behind revolutionary telescope. Cal State East Bay is helping astrophysicists expand our view of the universe. A first of its kind prototype gamma-ray telescope will soon change the way we see the cosmos. allowing scientists to study the most extreme events in the universe. The telescope, which is said to be 20-times more powerful than current technology and 100-times faster than similar telescopes

	• **Back to the Beginning** Cal State East Bay students to study at CERN, world's largest particle physics lab. The Large Hadron Collider steers particle beams to collide in the middle of the ATLAS detector. By examining the debris of the collisions, scientists are able to understand particles that existed in the early universe. Beyond fundamental research, the technology developed for the ATLAS detector has led to advances in phenomena and research ranging from the eye to the brain to creating a system for finding and rescuing people using infrared sensors • **The Race to Store Radioactive Waste** In the lab at Cal State East Bay, Tinnacher and her students are focusing on the role of the engineered barrier that would surround a container of radioactive waste and protect the surrounding area from contamination after the canisters erode. The overall goal of the project is how best to store uranium. • **Ruling Out Danger** Cal State East Bay research points toward human-made lead poisoning in Fruitvale and helps city leaders advocate for clean up. • **Why It Matters – Climate Change** Cal State East Bay Professor is introducing her environmental science students to cutting-edge technology, research they hopes will help fight climate change. this project will lead the on uncovering still Cal State East Bay Professor Patty Oikawa is introducing her environmental science students to cutting-edge technology, research she hopes will help fight climate change unanwersed question regarding climate chang • **groudbreaking study on universe** Professor of physics and team of graduate research team recently had an reserch report published, based on there groudbreaking research about measuring the size of distant stars. • **Skeleton from 3D print** An interdisciplinary project with students and faculty from the kinesiology and media arts departments using 3-D printing to repair skeletons was recently featured on NBC Bay Area.
California State University Fullerton	• **Student Digs Up Bone-Thrilling Research in two United Arab Emirates tombs** Using a foot bone called the talus, the research project focused on finding the minimum number of individuals and the extent of burning in two United Arab Emirates tombs containing fragmented commingled remains. When observing the extent of burning between the two tombs, it was evident that Unar 2 had more calcined bone, indicating an increase in cremation practices." • **Coastal Wetlands Research Possible Solution to Combat Climate Change**

	Team of young graduates worked on a research project on how carbon, one of the essential building blocks of organic life, buried in the soil of California's coastal wetlands can help combat climate change. Coastal wetlands are known as a "carbon sink" — meaning they are an ecosystem that can use and remove excess carbon, such as CO2 • **New Research May Hold Clues to Defeating Antibiotic-Resistant 'Superbugs'** Their latest published research results show that the use of zinc-containing compounds, along with existing antibiotics, is a novel strategy to overcome "superbug" infections. project resulted a new hope in finding formulations that permit the use of existing antibiotics to treat bacteria that acquire resistance to them. The team will continue the exploration of new venues to prolong the useful life of existing antibiotics, and further develop those ideas we tried in past years that show promise for use in humans. • **New Research Shows Microscopic Organisms in Gulf Limit Greenhouse Gases and Global Warming** study focuses on mineral formation by a community of unique microorganisms — tiny living organisms invisible to the naked eye — in the U.S. Gulf Coast subsurface. findings suggest that microscopic organisms, also known as microbes, destroyed vast quantities of methane in the subsurface of the Gulf of Mexico region. Ultimately, these microbes limit the natural release of massive quantities of this potent greenhouse gases into the atmosphere. This project open door for new methods to trackle climate change. • **Researchers Study Protein to Understand Genetic Disease** A team of Student researchers are working alongside Cal State Fullerton neuroscientist, contributing to advances into the mysteries of a rare inherited disorder that affects the brain, eyes and stomach. team of students researchers identified another protein called "TMEM163" that interacts with binds zinc, which could explain why zinc levels in lysosomes of ML-IV patients' cells are abnormal. This discovery provides a novel explanation of how a zinc imbalance occurs in ML-IV cells and how the disease kills the cells • **Scientific Discovery of Protein's Path Could Lead to Cancer Treatment** Groundbreaking CSUF Faculty-student Study Tracks a Surface Protein Present in Most Tumors, Cal State Fullerton molecular scientist and his team have discovered how a certain protein travels within stressed cells and cancer cells — a finding that could lead to new cancer treatments. Their research focuses on defining how and why this protein, which functions to keep the cell alive, travels to the surface of cancer and stressed cells • **Computer Scientists Develop Artificial Intelligence Model to Predict Crop Yield** A team of computer science graduate students hopes to help farmers forecast crop yields by delving into the field of artificial intelligence,

	known as AI, and creating algorithms — steps a computer takes to solve a problem — to predict wheat crop production by using past weather and soil data. By using past data, we can predict the best models for wheat prediction in the future and help farmers predict the unavoidable risks and losses in farming • **Engineering Students Develop Smart Drone to Predict Wildfire Spread and Fight Climate Crisis** project's vision is to create a system using smart drone technology (WAFERS) to predict and track the spread of wildfires, and ultimately, prevent fires from growing to an uncontrollable size. ultimate goal is to fully develop a fire simulation model that is capable of producing accurate results in a timely manner,". "The algorithm that the team was able to create has shown results with very high accuracy. This could mean that in real-life scenarios, WAFERS could offer a faster, cheaper and more efficient approach to predict wildfire spread."