San Diego State University values all scholarship - whether it’s the discovery of a new virus, a “jewelry portrait,” an orchestral composition, a book about the first female presidential assistant, digitizing Shakespeare’s historical map of London, exploring the Ukrainian struggle, using Twitter to track the spread of influenza, excavating primitive burial grounds in Oaxaca, Mexico, understanding the evolution of antibiotic resistance or improving the efficacy of diabetes treatments in Latino and Latina populations.

While not all scholarship is grant-supported, it’s important to recognize the SDSU faculty and programs that are successful in highly competitive funding efforts with external sponsors. This brochure represents just a few of the more than 700 awards made to SDSU researchers last year. A complete list of 2013-14 grants can be found here: http://tinyurl.com/awardslisting.

Congratulations to all the SDSU scholars who are innovating, engaging our students and enhancing their lives, the community, and the world.

Stephen C. Welter
Vice President for Research and Dean of Graduate Affairs
San Diego State University

Front Cover: Paradise Tanager (Tangara chilensis). See page 2. Photo by Matt Alexander

Back Cover: This “snapshot” of the human IKK2 enzyme might have caught it in the act of switching to its active state. If that is true, then molecules that block this interaction might serve as drugs against chronic inflammatory diseases and cancer in which IKK2 is overactive. See page 8.
The National Science Foundation supports Dr. Julio Valdes’s research efforts to develop a novel technique for strengthening sandy soils by ‘heat-gluing’ the grains together with recycled plastic. The soil is mixed moist with tiny amounts of recycled plastic powder. Applied heat melts the plastic particles and upon cooling, they solidify, bonding the soil grains together. The result is a bonded soil with high stiffness and strength. An important feature of the technique is that the bonds achieved are ductile (instead of brittle) and healable (broken bonds can be healed with heat).

The technology may have profound implications in the future of ground improvement for sustainable infrastructure systems; for example, flexible pavement bases, and for reducing the soil’s susceptibility to liquefaction during earthquakes.

Top: Cylindrical specimen of plastic-bonded-sand. Photo by Geo-Innovations Research Lab, SDSU

Middle: Two sand particles sharing a hardened plastic bond. Photo by S. Barlow

Bottom: Dr. Julio Valdes (rear, center) with research students (standing L to R) Nicole Garcia, Marianna Figueiredo, Nicole Salem, Pouya Golshan, Kioomars Ravaghi and seated Jacquelyn Vila, Angelica Rojas-Colin. Photo by Geo-Innovations Research Lab, SDSU
Faster Analysis, Superior Design

ROBERT K. DOWELL
Civil, Construction, and Environmental Engineering

SDSU’s Structural Engineering Lab houses a unique “shaking table” designed and built by Dr. Robert K. Dowell and used for testing the structural integrity of buildings, building components, anchors, seismic dampers, and red clay roof tiles. The shaking table has applied accelerations that are larger than have ever been measured in a real earthquake.

An expert in seismic analysis and structural engineering, Dr. Dowell’s research is applied to the analysis, design and construction of bridges, buildings and ships. His new nonlinear seismic analysis method is thousands of times faster than existing methods, changing the way bridge structures will be designed.

Dr. Dowell’s work is supported by various companies including McQuarrie Temolen Group and Hilti Corporation.

Top: The Dowell research team from left to right: Chethan Kubsad (student), David Riley (student), Robert Kochan (student), Josh Reece (student and NASSCO engineer), Akash Patel (engineer), Carol Stein (student), Dr. Dowell (Principal Investigator and Lab Director), Greg Morris (Technician and Lab Manager), Crystal Garcia (student), Noel Brisen (student), Bestun Rashid (student) and Spencer Phillipo (student), all standing in front of a completed test setup.

Middle: Tallest building on Guam; Dr. Dowell served as an expert consultant for a detailed nonlinear seismic analysis due to recent increased seismic hazard maps developed by the USGS for Guam.

Middle: Analysis model for Guam building (displacements exaggerated for viewing purposes).

Bottom: Building component fully collapsed on the shaking table, indicating failure of the anchors and end of the dynamic structural test.

Photos by Dowell Lab
Designing the Next Generation Lighter, and Durable Aerospace Structures

SATCHI VENKATARAMAN
Aerospace Engineering

Composite materials due to their lightweight and high strength are increasingly used in aerospace structures. The ability to predict “failure” in composite structures and their behavior as they age is critical for the aerospace industry to safely operate planes.

Dr. Satchi Venkataraman is an expert in analysis and design of aerospace structures, structural optimization and risk assessment. His research is helping to understand failure modes in composite structures, durability of bonded and bolted joints, and developing methods to design lighter and safer structures.

Dr. Venkataraman’s work is supported by NASA, Office of Naval Research (jointly with UCSD), Air Force Office of Scientific Research (jointly with NextGen Aeronautics) and Northrop Grumman.

Top: Compression testing of composite aircraft panels to measure residual strength after impact damage. Photo by Satchi Venkataraman

Middle: Finite Element Analysis (FEA) simulation of stresses in a sandwich composite tapered closeout joint region due to tension loads. Photo by Andrew Christensen, Katherine Kucharski, Satchi Venkataraman

Bottom: Photograph of a sandwich composite beam showing failure at the tapered closeout joint region after the tensile testing. Photo by Scott James, Brett Sens, Satchi Venkataraman
### Awards by Sponsor Type Fiscal Year 2013-2014

![Pie chart showing distribution of awards]

- **Corporations (2%)**
  - $1,541,233
- **Foundations (5%)**
  - $5,079,182
- **Total Awards**
  - $107,857,290
- **Federal (51%)**
  - $55,381,212
- **State & Local (25%)**
  - $27,207,125
- **Other (17%)**
  - $18,648,538

### SDSU Doctoral Programs

SDSU is proud to offer these joint doctoral programs:

<table>
<thead>
<tr>
<th>MAJOR/CONCENTRATION</th>
<th>PARTNER UNIVERSITY</th>
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<tbody>
<tr>
<td>Audiology (Au.D.)</td>
<td>UC San Diego</td>
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<tr>
<td>Biology</td>
<td>UC San Diego</td>
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<tr>
<td>Chemistry</td>
<td>UC San Diego</td>
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<tr>
<td>Clinical Psychology</td>
<td>UC San Diego</td>
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<tr>
<td>Computational Science</td>
<td>Claremont Graduate University</td>
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<tr>
<td>Computational Science: Statistics</td>
<td>Claremont Graduate University</td>
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<tr>
<td>Ecology</td>
<td>UC Davis</td>
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<tr>
<td>Education</td>
<td>Claremont Graduate University</td>
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<tr>
<td>Education Leadership: Pre K-12 School Leadership</td>
<td>Independent</td>
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<tr>
<td>Education Leadership: Community College/Post-Secondary Leadership</td>
<td>Independent</td>
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<tr>
<td>Engineering Sciences: Bioengineering</td>
<td>UC San Diego</td>
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<tr>
<td>Engineering Sciences: Electrical &amp; Computer Engineering</td>
<td>UC San Diego</td>
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<tr>
<td>Engineering Sciences: Mechanical &amp; Aerospace Engineering</td>
<td>UC San Diego</td>
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<tr>
<td>Engineering Sciences: Structural Engineering</td>
<td>UC San Diego</td>
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<tr>
<td>Evolutionary Biology</td>
<td>UC Riverside</td>
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<tr>
<td>Geography</td>
<td>UC Santa Barbara</td>
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<tr>
<td>Geophysics</td>
<td>Scripps Institution of Oceanography/UCSD</td>
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<tr>
<td>Language &amp; Communicative Disorders</td>
<td>UC San Diego</td>
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<td>Math &amp; Science Education</td>
<td>UC San Diego</td>
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<tr>
<td>Physical Therapy (DPT)</td>
<td>Independent</td>
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<tr>
<td>Public Health: Epidemiology</td>
<td>UC San Diego</td>
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<tr>
<td>Public Health: Global Health</td>
<td>UC San Diego</td>
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<tr>
<td>Public Health: Health Behavioral Sciences</td>
<td>UC San Diego</td>
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Other Distinctions

- SDSU faculty and staff garnered $107.8 million in support of their research programs.
- SDSU faculty and staff received 110 awards and $26 million from the National Institutes of Health.
- The National Science Foundation provided $9.6 million in awards to SDSU researchers.
- SDSU is classified as a research university with “high” research activity by The Carnegie Foundation.
- A major public research university, SDSU offers bachelor’s degrees in 90 areas, master’s degrees in 78 areas and doctorates in 23 areas.
- Last year’s Student Research Symposium showcased the work of more than 375 students from 86 majors in posters and oral presentations.
- SDSU continues its climb up the list of the top “Up-and-Coming Schools” in the nation, according to U.S. News & World Report’s annual ranking of America’s Best Colleges, having risen another notch to #13.
- SDSU is a top producer of Fulbright awardees.
- SDSU’s graduate programs in international business and rehabilitation counseling are ranked in the top 10 in the nation by U.S. News and World Reports. Other SDSU programs ranked among the top in the nation include: clinical psychology, audiology, nursing-midwifery, health care management, social work, education, public affairs, fine arts, biological sciences, speech language pathology, public health, psychology, business, and mechanical engineering.
- SDSU’s Confucious Institute promotes the teaching of Chinese language and culture and has been identified as one of eight model institutes worldwide.
- The SDSU Communication Master’s program has been named the tenth best in the world and the sixth best in the U.S. by Eduniversal Best Masters Ranking.
- A top LGBT-friendly campus, SDSU holds a five of five stars ranking. SDSU was the second university in the U.S. and the first in California to offer an undergraduate degree in lesbian, gay, bisexual and transgender studies.
- SDSU ranked #18 in Forbes’ list of “America’s Most Entrepreneurial Universities.”
- SDSU is nationally recognized as a military-friendly university, serving more than 3,000 student veterans, active duty, reservists and dependents each year.
- Thomson Reuters identified biology professors Walter Oechel and Forest Rohwer as two of the “World’s Most Influential Scientific Minds.”
- Mechanical engineer Karen May-Newman, founder of SDSU's bioengineering program, is working with surgeons to improve heart pumping devices.
- Professor Peter Larlham, of SDSU’s theater department, was selected as the first recipient of the Phi Kappa Phi Distinguished Service Award for his global achievements, particularly in helping young Tanzanian students.
- Professors Frank Harris III and J. Luke Wood are working with higher education institutions across the U.S. to enhance access, achievement and success among minority male community college students.
- Bioinformatics professor Rob Edwards and colleagues identified a previously undetected virus present in half the world’s population.
- SDSU exceeded the $500 million goal for its first comprehensive fundraising campaign. The campaign was extended to reach the new goal of $750 million.