

# CALIFORNIA STATE UNIVERSITY

## LOUIS STOKES

### ALLIANCE FOR MINORITY PARTICIPATION

**Phase I**  
**1993 - 1998**

**Phase II**  
**1998 - 2003**

**Phase III**  
**2003-2008**

**Senior**  
**2008-2013**



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# CALIFORNIA STATE UNIVERSITY LOUIS STOKES ALLIANCE FOR MINORITY PARTICIPATION

## IMPACT REPORT: 1993 - 2011

Dear Reader,

On behalf of the California State University-Louis Stokes Alliance for Minority Participation (CSU-LSAMP), I am honored to be able to introduce this special report, which chronicles the Alliance's 18-year history and the cumulative impact of its efforts on broadening participation in STEM disciplines. As the Alliance name indicates, CSU-LSAMP is an alliance of campuses of the California State University, which, since 1993, has been supported by grant funding from the National Science Foundation's (NSF) Louis Stokes Alliance for Minority Participation program. CSU-LSAMP is both grateful for the generous funding provided by the NSF and proud to be a member of the National LSAMP community.

Although this report emphasizes the impact of CSU-LSAMP on increasing participation of students from underrepresented minority (URM) groups in STEM, it is important to note that CSU-LSAMP does not limit participation to URM students or provide URM students preference in admission. Rather, eligibility is extended to students who are US citizens or permanent residents and face social, educational or economic barriers to careers in STEM. In addition, many of the activities offered by CSU-LSAMP are open to non-participants and many of the best practices developed by CSU-LSAMP have been institutionalized. Therefore, CSU-LSAMP's impact on improving STEM education reaches far more students.

Given the substantial investments made by the NSF, the Office of the Chancellor of the CSU and participating CSU campuses in the work of CSU-LSAMP, it behooves CSU-LSAMP to demonstrate that there has been a good return on these investments. And, we believe that the data presented in this report clearly demonstrate that this is the case. In summary, over the history of CSU-LSAMP, the data show: (1) a 2.5 fold increase in the number of STEM baccalaureate degrees awarded by the CSU to students from underrepresented minority (URM) groups; (2) increased persistence and graduation rates of LSAMP URM participants as compared to non-participants; (3) increased participation of URM students in STEM research and engagement in the global scientific community; and (4) increased progression of URM students to doctoral level study in STEM, both directly from the baccalaureate degree and through the project's Master's-level "Bridge to the Doctorate" activity.

CSU-LSAMP does not attempt in this report to place a dollar value on the full economic impact of investments made in the project. However, it has included an analysis of the economic benefit in work-life earnings that is likely to accrue to students who, without CSU-LSAMP, might not have completed a STEM baccalaureate degree. This analysis estimates that: (1) an additional \$1.8 billion in work-life earnings will accrue to URM students who might not have graduated with STEM degrees without CSU-LSAMP; (2) NSF's investment of \$15.6 million in CSU-LSAMP's undergraduate program to date will be returned over 100-fold in the increased earnings of additional URM-STEM graduates produced by CSU-LSAMP; and (3) the combined NSF and CSU investment of \$42.8 million in CSU-LSAMP's undergraduate program will be returned 43-fold in the increased earnings of additional URM-STEM graduates produced by CSU-LSAMP.

Finally, for those of us who have had the opportunity to work with individual CSU-LSAMP students, as campus coordinators, advisors, research mentors, administrators, or any other capacity, and have witnessed the life changing experiences and extraordinary achievements of CSU-LSAMP students, only a few of which are illustrated in this report, the return from CSU-LSAMP is priceless.

Thanks to all who have contributed over the years to the success of CSU-LSAMP and its students; and thank you, Reader, for your interest in this report.

Most sincerely,

Juanita Barrena, Ph.D.,

Lead Project Director, CSU-LSAMP, Professor of Biological Sciences, California State University, Sacramento



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# THE CALIFORNIA STATE UNIVERSITY

The California State University (CSU) was formed when the separate “California State Colleges” were brought together as a system by the Donahoe Higher Education Act of 1960. The campuses of the CSU include comprehensive and polytechnic universities and, since 1995, the California Maritime Academy, a specialized campus.

Today, with 23 campuses, over 430,000 students, and 44,000 faculty and staff, the CSU is the largest, the most diverse, and one of the most affordable systems of higher education in the nation.

Since 1961, the CSU has awarded more than 2.8 million bachelor’s, master’s, and joint doctoral degrees, including over 2.3 million baccalaureate degrees. Since 1975-76, about half of all baccalaureate degrees conferred in California have been awarded by the CSU. In 2009-2010, the CSU awarded 95,070 degrees, including 75,418 baccalaureate degrees.

Over the past two decades, the number of underrepresented minorities obtaining CSU undergraduate degrees more than doubled, growing from 9,108 in 1993-1994 to 19,608 in 2009-2010. Over the same time period, baccalaureate degrees awarded to Asian American students increased by 54% and the number of non-Hispanic White students earning baccalaureate degrees showed an overall decrease of 11%.

*Since 1961, the CSU has awarded more than 2.8 million bachelor’s, master’s and joint doctoral degrees*

*The CSU awards about half of the bachelor’s degrees and a third of the master’s degrees granted in California*

*Over the past two decades, baccalaureate degrees awarded by the CSU to students from underrepresented minority groups more than doubled*

# ABOUT CSU-LSAMP

## HISTORY

In 1993, the NSF's "Alliance for Minority Participation"<sup>1</sup> program provided the California State University (CSU) the impetus to bring its campuses together to develop a comprehensive and unified system-wide effort to increase the number of Science, Technology, Engineering and Mathematics (STEM) baccalaureate degrees awarded by the system to students from underrepresented minority (URM) groups. This effort, which became known as the California State University-Louis Stokes Alliance for Minority Participation (CSU-LSAMP), has proven to be highly effective; and, with on-going funding and program support from the NSF, the Office of the Chancellor of the CSU, and participating campuses, the project has grown in size and evolved in its scope.

At the time CSU-LSAMP was established, the Alliance included 18 CSU campuses, each associated with at least one California Community College partner. Since that time, new campuses were added to both the system and to the Alliance, which currently includes all 22 of the comprehensive and polytechnic universities of the CSU<sup>2</sup>.

## CSU-LSAMP "PHASES"

The CSU has been fortunate to have been awarded NSF-LSAMP funding for four successive five-year project periods. "Back in the day," these successive project periods were referred to as "Phases," but are now referred to as "Levels." As charged by the NSF, each successive project period has had somewhat different outcome objectives and programmatic emphases, building upon the accomplishments of the preceding period(s).

In Phase I, the major outcome objective was to increase aggregate URM-STEM baccalaureate degree production. Specifically, CSU-LSAMP proposed to double the number of STEM BA/BS degrees awarded by the CSU to URM students. To accomplish this, the program emphases were on development of partnerships with community colleges, providing summer bridge programs for freshman-level students at both the 2-year and 4-year institutions, and academ-

ic excellence workshops to improve student preparation in mathematics. In Phase II, CSU-LSAMP set its focus on improving individual URM-STEM student retention and progression to the baccalaureate degree by expanding academic support to a wider range of "gatekeeper" science courses for both freshman and sophomore-level students and improving the preparation of community college students for transfer. By Phase III, many of the lower division practices and transfer bridges developed and supported by LSAMP in prior phases were institutionalized, providing CSU-LSAMP the opportunity to look beyond the baccalaureate to improving aggregate student progression to STEM graduate programs. Therefore, in Phase III, the CSU-LSAMP program began a transition from a program that primarily supported lower division students in introductory science courses and pre-transfer activities to a program that primarily served upper division students in research and other activities designed to motivate them to pursue graduate study and enhance their competitiveness. CSU-LSAMP's attainment of Phase III status also coincided with the introduction of the NSF-LSAMP "Bridge to the Doctorate (BD) Activity," and CSU-LSAMP was awarded five BD activities during its Phase III project period. In 2008, CSU-LSAMP became a Senior-level LSAMP, and its objectives were again modified to build on past accomplishments in a manner that furthers the NSF's goal of preparing a diverse, globally engaged scientific and technological workforce. Therefore, as a Senior-level LSAMP, the focus of the current project period is on individual student persistence and progression to graduate study, institutionalization and dissemination of best practices, and expanding opportunities for student engagement in international activities. In addition, during the current project period, CSU-LSAMP has been awarded support for four BD activities.

<sup>1</sup> Later renamed in honor of Louis Stokes, former Congressional Representative from Ohio, 1969-1998.

<sup>2</sup> California Maritime Academy, a specialized campus, is not a participant in CSU-LSAMP.

PHASE I (1993-1998)	PHASE II (1998-2003)	PHASE III (2003-2008)	SENIOR LEVEL (2008-2013)
Double the number of STEM baccalaureate degrees awarded by the CSU to URM students	Improve individual URM-STEM student success and progression to the baccalaureate degree	Improve aggregate student progression to STEM graduate programs	Improve individual student persistence and progression to graduate study, and engagement in international activities

## IMPACT OF NSF'S SUPPORT OF THE CSU-LSAMP UNDERGRADUATE PROGRAM

### PROVIDING A STRATEGIC FRAMEWORK FOR THE CSU'S EFFORTS TO BROADEN PARTICIPATION IN STEM

Although several of the campuses of the CSU had STEM support programs in place prior to the creation of CSU-LSAMP, most of these programs focused on specific disciplines and there was relatively little communication of best practices among the campuses. However, the NSF's support of the creation of an Alliance among the campuses provided the opportunity to expand, coordinate and leverage the expertise and resources of the campuses in a focused system-wide effort to broaden participation in STEM. Importantly, over the years, the NSF's vision for the LSAMP program and its expectations for successive "phases/levels" provided a strategic framework for the CSU's development and institutionalization of effective practices at progressively higher stages in the STEM pathway, from entry at the freshman and transfer levels to support of upper division students and advancement to graduate study.

### ENGAGING THOUSANDS OF STUDENTS FROM DIVERSE POPULATIONS IN STEM ENRICHMENT ACTIVITIES

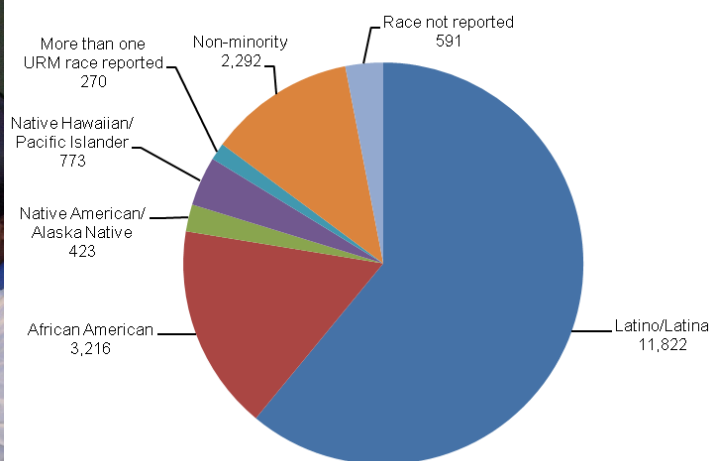
CSU-LSAMP admitted its first group of participants in Summer 1994; and, as of Spring 2010 has enrolled 19,387 participants, including 16,504 students from underrepresented racial/ethnic groups. Data on the number of new students who were admitted to CSU-LSAMP in each project period is provided in Table 1. The racial/ethnic composition of the total population of CSU-LSAMP's participants is provided in Figure 1 below.

*Table 1. Number of new CSU-LSAMP Participants admitted 1994-2010.*

	<i>Phase I</i>	<i>Phase II</i>	<i>Phase III</i>	<i>Senior</i>	<i>Total</i>
URM	4,296	5,332	5,560	1,316	16,504
Non-URM	343	2,103	229	208	2,883
Total	4,639	7,435	5,789	1,524	19,387



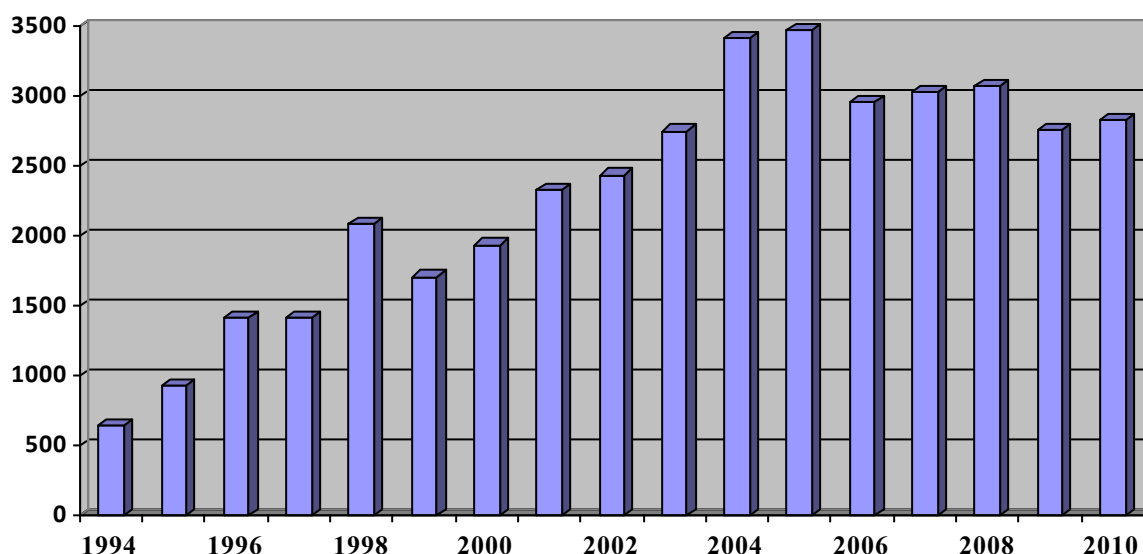
*Figure 1. Participant Racial/Ethnic Composition*



## THE CALIFORNIA STATE UNIVERSITY - LOUIS STOKES ALLIANCE FOR MINORITY PARTICIPATION

Since 1993-1994, combined funding support from the NSF's LSAMP program, the CSU Office of the Chancellor and participating campuses, has enabled CSU-LSAMP to engage an average of over 2000 participants annually in academic support and STEM enrichment activities. The number of participants per year increased steadily each year from 641 in 1993-1994 to 3,476 participants in 2004-2005 (the second year of Phase III). However, as expected, over the course of Phase III and into the current Senior-level project, as CSU-LSAMP transitioned from a program that primarily provided group activities for lower division students (e.g., summer bridge and academic excellence workshops) to a program with an increased emphasis on engagement of upper division students in mentored research and preparation for graduate study, the number of participants served annually decreased to the current level of approximately 2,800/year. These trends in the number of annual participants are illustrated in Figure 2 below.

*Figure 2. Annual Number of CSU-LSAMP Participants 1994-2010.*



*CSU Monterey Bay LSAMP Students at the 2009 SACNAS Conference*



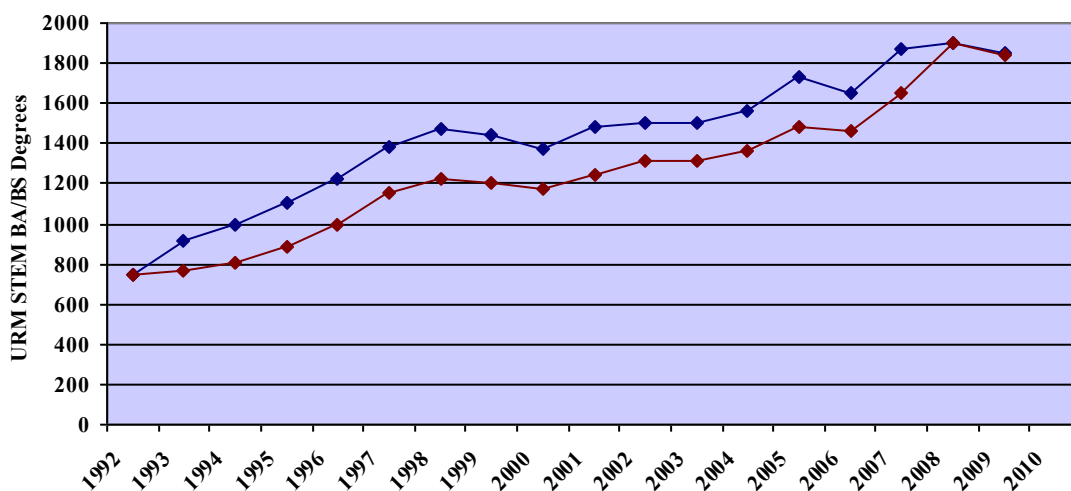
*2008 Cal Poly Pomona LSAMP Summer Bridge Students*



## DOUBLING THE NUMBER OF STEM BACCALAUREATE DEGREES AWARDED BY THE CSU TO STUDENTS FROM UNDERREPRESENTED MINORITY GROUPS

The primary objective of the initial Phase I CSU-LSAMP project was to double the number of STEM baccalaureate degrees awarded by the CSU to URM students from the 1992-1993 benchmark of 750/year to 1,500/year in 1998-1999. Although the exact numerical goal was missed by 27 students, CSU-LSAMP considers its achievement of a 96.4% increase (i.e., the award of 1,473 BA/BS STEM degrees to URM students in 1998-1999) to be a notable accomplishment. BA/BS STEM degrees awarded by the CSU to non-URM students increased by only 5% over the same time period. URM STEM degree production by the CSU remained relatively stable over most of Phases II and into the beginning of Phase III. However, in light of several changes in State and system-wide policies in the late 90's, which differentially impacted admissions of URM students, maintaining degree production at this higher level is also viewed as an accomplishment. Toward the end of Phase III and into the current Senior-level project period, URM-STEM degree production increased above 1,700/year and appears to be on an upward trajectory, with 1,849 BA/BS STEM degrees awarded to URM students in 2009-2010. Therefore, since the inception of the project, there has been a 2.5-fold increase in annual URM-STEM degree production. Notably, the CSU awarded a total of 24,973 STEM BA/BS degrees to URM students from 1993-1994 through 2009-2010. Of these degrees, 21,780 were awarded by campuses participating in CSU-LSAMP, and an estimated 5,000 of these degrees were awarded to CSU-LSAMP level-1 URM participants. Annual URM-STEM degree data from the 1992-1993 base-line year through 2009-2010 are provided in Figure 3 below. The figure includes data for all CSU campuses awarding degrees during each year (blue line) as well as degrees awarded by campuses participating in CSU-LSAMP during that year (red line).

**Figure 3. Annual Number of BA/BS STEM Degrees awarded by All CSU campuses (blue line) and by CSU-LSAMP Campuses (red line) to URM Students 1992-93 to 2009-2010.**



Data sources: WebAMP Reverse Site Reports (for participating campuses), WebAMP ExACT Reports (for non-participating campuses prior to Phase III), and CSU Analytic Studies Division degree files (for non-participating campuses during Phase III and Senior-level). The number of degrees for participating campuses includes only those campuses participating in the Alliance during that year. During Phase I, 18 of the 19 CSU campuses existing at the time participated in the Alliance. CSU Monterey Bay joined the alliance at the beginning of Phase III. CSU Channel Islands, Cal Poly San Luis Obispo and CSU San Marcos joined the Alliance at the beginning of the Senior-Level project. The only CSU campus that currently does not participate in CSU-LSAMP is the California Maritime Academy, which is a unique and specialized campus of the CSU.



*During Phase I of CSU-LSAMP, the number of STEM BA/BS degrees awarded to URM students increased by 96.4%, from the pre-award base-line of 750 to 1,473 at the end of the first project period in 1998.*

*In 2009-2010, the CSU awarded 1,849 BA/BS degrees to URM students, a 2.5 fold increase over the 1992-1993 base-line.*

*From 1993-1994 through 2009-2010, the CSU awarded 24,973 STEM BA/BS degrees to URM students.*

*From 1993-1994 to 2009-2010, STEM BA/BS degrees were awarded to an estimated 5,000 CSU-LSAMP URM students.*



*Above: Daniel Wambua, BS Biology, 2011, CSU San Marcos. Daniel will begin his Ph.D. program in Virology at Harvard Medical School in Fall 2011.*



*Left: Elizabeth Ruvalcaba, BS Industrial Engineering, 2011, CSU East Bay. Elizabeth is currently working at Space Systems Loral as a Manufacturing Engineer at the Bus Electronics Division. She will be attending Santa Clara University part time in Fall 2011 to pursue an advanced degree in Engineering Management.*

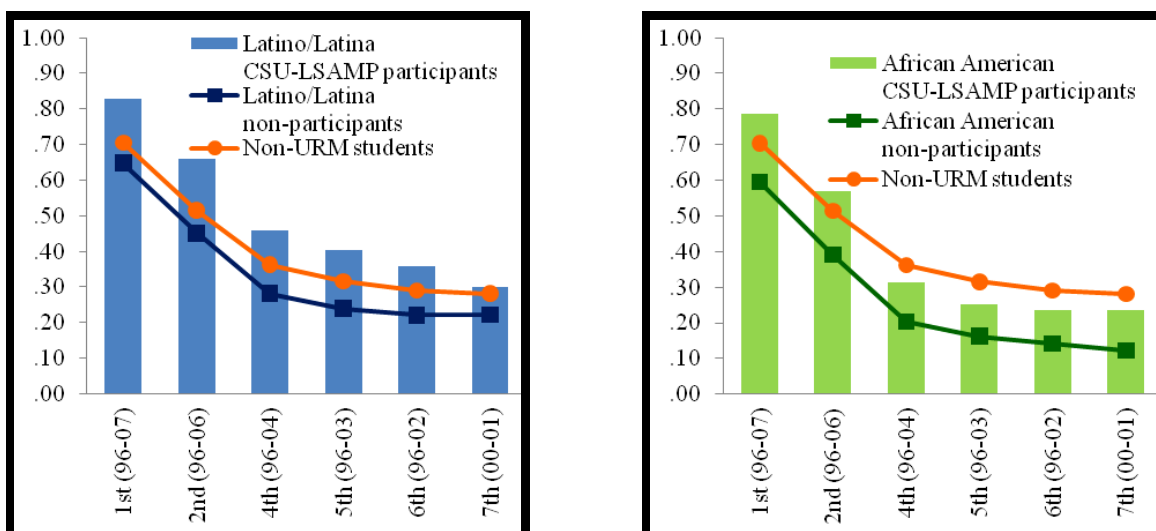
## IMPROVING PERSISTENCE OF URM STUDENTS IN STEM

In Phase I, CSU-LSAMP's primary outcome objective was to increase aggregate URM-STEM baccalaureate degree production by the CSU. However, since a number of factors, including increased total enrollments and passive changes in the demographics of a population, can contribute to achieving this objective without redressing the great disparity between persistence of URM students in STEM as compared to non-URM students, CSU-LSAMP placed increased emphasis in Phase II on implementation of strategies designed to substantially narrow or eliminate this gap. Therefore, although continuing to be attentive to aggregate degree production, CSU-LSAMP's primary outcome objective in Phase II and subsequent project periods has been to improve persistence rates of URM students in STEM.

To assess the impact of CSU-LSAMP participation on persistence in STEM, the Institute for Social Research (ISR) at California State University, Sacramento (the project's evaluator) conducted longitudinal studies comparing persistence rates (i.e., the percent of a cohort remaining or graduating in a STEM major) of annual cohorts of CSU-LSAMP Hispanic and African American participants with CSU benchmark cohorts for the period beginning in 1996-1997 and ending in 2009-2010. To enable comparison with CSU benchmark cohort data available from the Consortium for Student Retention Data Exchange (CSRDE), the CSU-LSAMP cohorts include only participants entering the CSU as first-time freshman with declared majors in STEM. Comparisons were not conducted for Native Hawaiian/Pacific Islanders since separate benchmark data from these groups are not available from CSRDE or for Native American and Alaska Natives since the small numbers in these cohorts are likely to produce unstable rates.

The ISR study clearly demonstrated that participation in CSU-LSAMP is associated with improved persistence of Hispanic and African American students in STEM. Controlling for race and ethnicity, the differences in first through seventh year persistence rates for Hispanic and African American participants and estimates for non-participants from these groups are substantial, ranging from 1.3 times higher for both groups in the first year to 1.9 times higher for African Americans in the 7th year. In addition, Hispanic CSU-LSAMP participants had higher first through seventh year rates than all other comparison groups, including Asian and non-Hispanic white students. African American participant persistence also exceeded rates for non-URM students in the first and second years; and although rates fell below those of non-URM groups in the 4th year, they were much greater than rates for African American non-participants. Comparisons of average persistence rates are provided in Figure 4 below. The averages summarize persistence rates across cohort years. The number of cohorts in each average necessarily vary and are noted.

*Figure 4. Comparison of Latino and African American Participant STEM Persistence Rates*



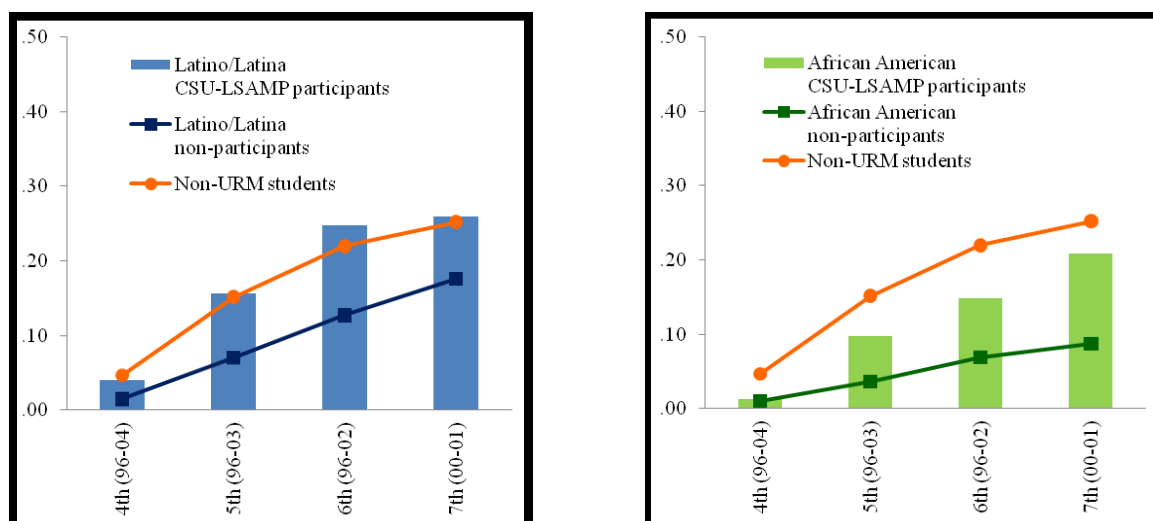
## IMPROVING GRADUATION RATES OF URM STUDENTS

In the California State University (CSU), as in many colleges and universities across the nation, there is a considerable gap between graduation rates for URM and non-URM students. For example, in the CSU, non-Hispanic White students who enter as first-time freshmen with declared majors in STEM have six-year STEM discipline graduation rates that are generally about 1.6 times higher than rates for Hispanic students and about 3.2 times higher than rates for African American students. However, longitudinal cohort studies conducted by the Institute for Social Research (ISR) at Sacramento State show that this gap is narrowed substantially for Hispanic and African American students who are participants in CSU-LSAMP and that participant graduation rates have improved over time. These findings are described below and illustrated in Figure 5.

The average four-year STEM graduation rate of Hispanic CSU-LSAMP participants is 2.7 times higher than that of Hispanic non-participants. Respectively, five and six-year graduation rates of Hispanic participants are 2.2 and 1.9 times higher than Hispanic non-participants. Importantly, for Hispanic participants, fourth, fifth and sixth year graduation rates equal or exceed rates for Asian/PI and non-Hispanic White comparison groups. The average four-year graduation rate of African American participants is 1.3 times higher than that of African American non-participants. For African American students, the difference widens in the fifth and six years. Respectively, five and six-year graduation rates of African American participants are 2.7 and 2.2 times higher than those of African American non-participants. Although average graduation rates for African American participants are lower than non-URM comparison groups, the gap is much smaller than the gap that exists for African American non-participants. For example, the average six-year STEM graduation rate of African American participants is 15.9% as compared to 22% for non-URM students, while the rate for African American non-participants is 7.1%.

It is important to note that the comparisons made above and shown in Figure 5 are comparisons of computed averages for the 1996-2004 cohorts and that rates for individual cohort years have increased over time for all groups. For example, for the 1996 cohort of Hispanic participants, the rate was 24.2% as compared to 39% for the 2004 cohort. Similarly, the rate for African American participants was 3.8% in 1996 as compared to 25.5% in 2004. Rates for Hispanic and African American non-participants, respectively, were 9.1% and 3.8% in 1996 as compared to 16.1% and 9.2% in 2004. Rates for Asian and White non-URM students, respectively, were 19.3% and 20.4% in 1996 as compared to 27% and 30.3% in 2004.

*Figure 5. Comparison of Latino and African American Participant STEM Graduation Rates*



## BROADENING PARTICIPATION IN STEM AT THE BACCALAUREATE LEVEL

To date, the NSF's funding of CSU-LSAMP has supported 19,387 undergraduate STEM students, including 16,504 URM students, in activities designed to improve the quality of their STEM education and their persistence to the baccalaureate degree. To assess the effectiveness of this investment on degree completion rates, the Institute for Social Research (ISR) conducted a study of baccalaureate degree attainment by students who participated in CSU-LSAMP at any time from 1993-1994 to 2009-2010. Although it would have been ideal to be able to use data on degree attainment for all 19,387 participants, the scope of the study was necessarily limited (because of the large number) to students who could be matched by Social Security number to CSU system records and degrees awarded by the CSU up to June 30, 2010. However, since 69.3% of participants (13,431 students) could be matched in this way and since a separate study limited to Phase III participants showed that only 1.5% of participants earned degrees at non-CSU campuses, CSU-LSAMP is confident that degree completion rates determined for this subset can be used to develop estimates of degree completion for the larger group.

The study showed that 6,325 (47%) of the 13,431 tracked participants earned BA/BS degrees in any discipline and that 4,298 of these degrees were in STEM, for a STEM degree completion rate of 32%. Of the STEM degrees, 3,361 (78%) were awarded to students from URM groups, and the degree completion rate for URM students was 29.8% (i.e., 3,361 out of the 11,268 matched URM participants). Assuming that the same degree completion rates through 2010 will apply to the remaining 30.7% of participants who were unable to be tracked in the study, ISR estimates that 6,166 CSU-LSAMP participants earned STEM BA/BS degrees by June 2010, and that 4,918 of these STEM degrees were awarded to URM participants. (see Table 2 on facing page for complete data)

It is important to emphasize that a substantial number of participants who entered CSU-LSAMP in Phase III and the current Senior-level project were continuing in enrollment at the time degree data were obtained. Specifically, 54% of students who entered in Phase III and 94% of participants who entered during the Senior-level project were continuing in enrollment. Therefore, the rates reported above and in Table 2 underestimate the number of participants who will actually earn STEM BA/BS degrees. To obtain an estimate of degrees likely to be produced by 2015, ISR developed a model which applies the 2010 degree completion rates for the 1999-2004 participants in a given category (e.g. URM-STEM) to all participants in that category. Rates for the 1999-2004 cohorts were chosen since graduation rates have generally increased throughout the project making it likely that Phase III and Senior-level participants will graduate at rates greater than participants who entered in prior years. The rates applied were: 35.5% for URM-STEM degrees, 46.6% for non-URM STEM degrees, 54.6% for all URM degrees, and 67.7% for all non-URM degrees. Using this model ISR estimated that, by 2015, 10,615 of the 19,387 CSU-LSAMP participants will graduate with bachelor's degrees in any discipline, with 8,698 earned by URM students; and that 6,814 of these degrees will be in STEM, with 5,496 of the STEM degrees earned by URM students. (Table 2 and Figure 6.)

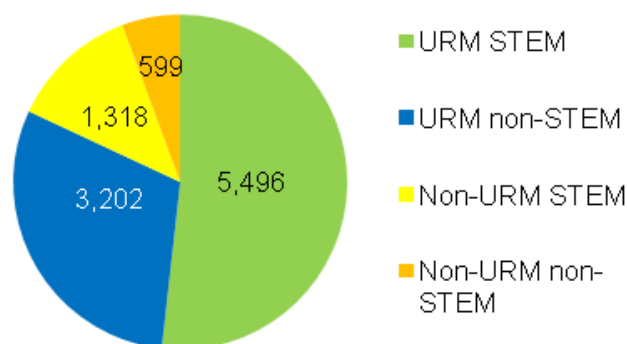
In light of the relatively large number of non-STEM degrees earned by URM participants who were initially declared as STEM majors, it was of interest to determine how the proportions of STEM/non-STEM degrees earned by CSU-LSAMP URM participants who were initially declared as STEM compared with the proportion for URM non-participants who entered as STEM majors. For this study, ISR examined STEM/non-STEM completion rates of participants and non-participants who matriculated as STEM majors from 1996-2004. This study showed that URM participants who matriculated and graduated within six years were far more likely to graduate in a STEM discipline than non-participants. Specifically, 70% of the degrees earned by Hispanic participants were STEM degrees, as compared to 42% for non-participants. For African American participants, 51% of the degrees earned were STEM degrees, as compared to 32% for African American non-participants.

# THE CALIFORNIA STATE UNIVERSITY - LOUIS STOKES ALLIANCE FOR MINORITY PARTICIPATION

**Table 2. 1994-2010 Participant BA/BS Degree Completion by 2010 and Projected completions by 2015**

			<i>Phase I</i>	<i>Phase II</i>	<i>Phase III</i>	<i>Senior</i>	<i>Total</i>
Number of participants entering CSU-LSAMP program	URM		4,296	5,332	5,560	1,316	16,504
	Non-URM		343	2,103	229	208	2,883
	Total		4,639	7,435	5,789	1,524	19,387
Number of participants matched to CSU system records	Number who earned a STEM bachelor's degree by 2010	URM	603	1,263	1,398	97	3,361
		Non-URM	63	760	80	34	937
		Total	666	2,023	1,478	131	4,298
	Number who earned any bachelor's degree by 2010	URM	1,013	2,034	1,836	107	4,990
		Non-URM	99	1,106	92	38	1,335
		Total	1,112	3,140	1,928	145	6,325
	Total number of matched participants	URM	2,114	3,856	4,226	1,072	11,268
		Non-URM	174	1,632	189	168	2,163
		Total	2,288	5,488	4,415	1,240	13,431
STEM 2010 graduation rate of matched participants	URM		28.5%	32.8%	33.1%	9.0%	29.8%
	Non-URM		36.2%	46.6%	42.3%	20.2%	43.3%
	Total		29.1%	36.9%	33.5%	10.6%	32.0%
Overall 2010 graduation rate of matched participants	URM		47.9%	52.7%	43.4%	10.0%	44.3%
	Non-URM		56.9%	67.8%	48.7%	22.6%	61.7%
	Total		48.6%	57.2%	43.7%	11.7%	47.1%
Estimated number of participants graduating by 2010	Estimated number of participants graduating in STEM by 2010	URM	1,224	1,749	1,840	118	4,918
		Non-URM	124	980	97	42	1,248
		Total	1,348	2,729	1,937	160	6,166
	Estimated number of participants graduating in all disciplines by 2010	URM	2,058	2,810	2,413	132	7,311
		Non-URM	195	1,426	112	47	1,780
		Total	2,253	4,236	2,525	179	9,091
Projected number of participants graduating by 2015	Projected number of participants graduating in STEM by 2015	URM	1,224	1,749	1,974	467	5,496
		Non-URM	124	980	107	97	1,318
		Total	1,348	2,729	2,081	564	6,814
	Projected number of participants graduating in all disciplines by 2015	URM	2,058	2,810	3,036	719	8,698
		Non-URM	195	1,426	155	141	1,917
		Total	2,253	4,236	3,191	860	10,615

**Figure 6. Projected Numbers of BA/BS Degrees to be earned by 1994-2010 Participants by 2015**

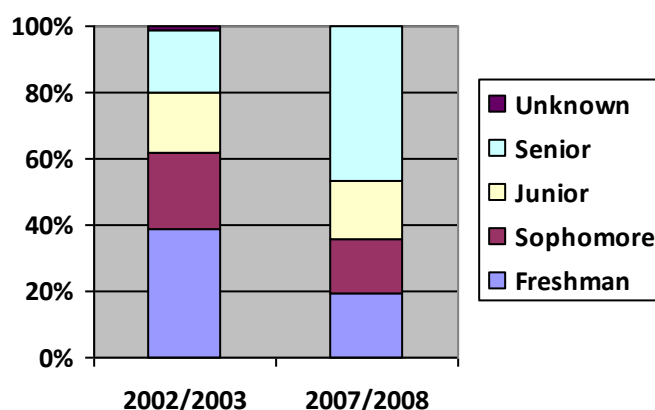




## MOTIVATING AND PREPARING STUDENTS TO PURSUE GRADUATE STUDY AND RESEARCH CAREERS IN STEM

By the beginning of Phase III of CSU-LSAMP, many of the practices that were developed and supported by LSAMP in prior phases had been institutionalized, providing CSU-LSAMP the opportunity to transition from a program that primarily supported lower division students in introductory science classes and pre-transfer activities to a program that provides support for students at all levels and that places an emphasis on engaging upper division students in research and other activities designed to motivate and prepare them for graduate study. Indeed, as shown in Figure 7 below, over the course of Phase III, the proportions of lower division and upper division level-1 participants were reversed. Specifically, in 2002-2003 (the end of Phase II), freshman and sophomores comprised 62% of participants; whereas in 2007-2008 (the last year of Phase III), juniors and seniors comprised 64.5% of participants.

*Figure 7. Change in the Class Level Composition of CSU-LSAMP Participants*



CSU-LSAMP's increased emphasis on research and other graduate school preparation activities is reflected in increases in the number of level-1 students participating in these types of activities over the course of Phase III (Table 3 below). For example, over the course of Phase III, the number of level-1 students participating in LSAMP supported research increased from 185 in 2003-2004 to 430 in 2007-2008. Similarly, over this same time period, the number of level-1 students participating in graduate school visits or orientations increased from 94/year to 254/year. The impact of these efforts on persistence to the baccalaureate degree and aggregate progression of Phase III participants to STEM graduate study are discussed in the next section. For the current Senior-level project, CSU-LSAMP has further expanded its support for student participation in research and preparation for graduate study.

**Table 3. Phase III Student Participation in Research and Other Graduate School Preparation Activities**

	2003- 2004	2004-2005	2005-2006	2006-2007	2007-2008
Research programs (AY, Sum, YR)	185	241	301	415	430
Conferences	255	188	269	259	338
Graduate School Visits/Orientations	94	95	147	178	254
Other Grad School Prep Activities	427	488	446	538	549



# THE CALIFORNIA STATE UNIVERSITY - LOUIS STOKES ALLIANCE FOR MINORITY PARTICIPATION



**Above: Gabriel Rodriguez, BS Earth Systems Science and Policy, CSU Monterey Bay, 2008.** The CSU-LSAMP program supported Gabriel's capstone research at Moss Landing Marine Laboratories on invasive Asian kelp (*Undaria pinnatifida*). Gabe was awarded an NSF Graduate Research Fellowship to pursue his Ph.D. at the University of California, Santa Barbara in the Department of Ecology, Evolution and Marine Biology.

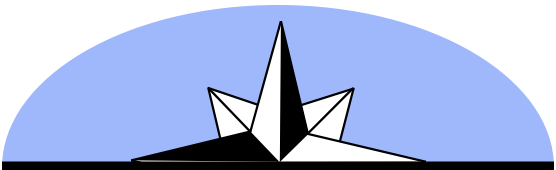
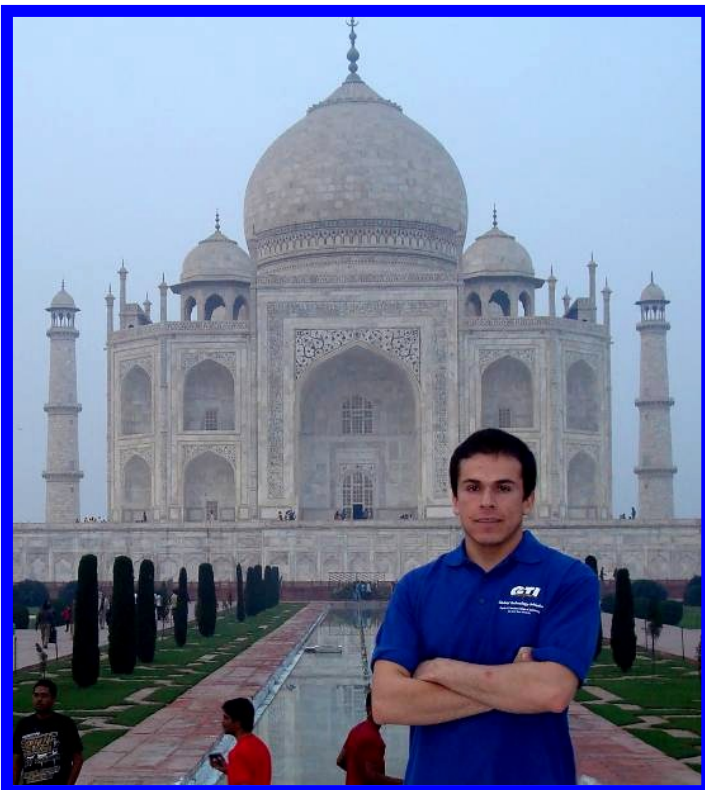


**Above : William Whalen, BS. Biology, CSU Fresno, 2010.** As an undergraduate student, William played a dynamic role in LSAMP as a Facilitator for LSAMP AEW's for biology and served as a Peer Mentor. He also participated in an LSAMP Research Internship. William is currently an MS student in Biology at CSU Fresno, engaged in research on patterns of non-muscle myosin II (NMII) in metastatic breast cancer cells.

**Above: Sylvia Bonilla, BS Biology, CSU Dominguez Hills, 2008.** As a CSU-LSAMP undergraduate, Sylvia conducted research on morphological changes that occur in the actin skeleton of light- and dark-adapted retina. She participated in summer research at Oxford University, UK in the lab of Prof. Kieran Clarke, studying the influence of erythropoietin treatment and insulin deficiency on rodent heart failure. Sylvia is a fourth year Ph.D. student in the Dept. of Bio. Sciences at Purdue University studying gene regulatory networks involved in zebrafish eye development.

## EXPANDING OPPORTUNITIES FOR ENGAGEMENT IN THE GLOBAL SCIENTIFIC COMMUNITY

For the current Senior-level project period (2008-2013), CSU-LSAMP has continued its emphasis on undergraduate research and preparation for graduate study, but with special attention to expanding opportunities for students to become engaged in the global scientific community. To assess progress toward achieving the latter goal, the project began monitoring participation in STEM international activities in the final year of Phase III. In that year (2007-2008), campuses reported that 13 participants engaged in STEM international activities; whereas, for years 1 and 2 of the current period, respectively, campuses reported that 25 and 42 students engaged in activities of this type. These activities include participation in international REU's, NAPIRE, study abroad, and other programs offered by non CSU-LSAMP institutions, as well as programs offered by CSU-LSAMP institutions. Although in most cases, programs offered by CSU-LSAMP institutions are open only to the institution's matriculated students, CSU-LSAMP has also developed two international research experiences that are open to CSU-LSAMP students Alliance-wide. International programs offered by CSU-LSAMP institutions include CSU Fresno's "International Activity in Cambodia", CSU Channel Island's "International Research Experience in Italy", and CSU Dominguez Hills's "International Research Experience Program at La Selva Biological Station." The two newly developed Alliance-wide programs are: "Global Awareness in Austria", a biotechnology research experience at the Innsbruck Medical University and Innsbruck Biocenter in Austria", created by LSAMP at CSU Fullerton and offered for the second time in Summer 2011; and "PROJECT NUTRia" (Neotropical Undergraduate Training and Research), a program developed by CSU Monterey Bay and offered for the first time in Summer 2011, which engages 8 CSU-LSAMP students from across the Alliance in field research at San Miguel Biological Station in the Cabo Blanco Absolute Reserve in Costa Rica.



Allen Velasquez (CSU-LSAMP student in Civil Engineering at San Jose State) participated in the "Global Technology Initiative" in India in January 2009. This is what Allen had to say about this experience:

*... By seeing the ways in which high-tech companies in India attract employees and attitudes in which students enrolled in IIT's approach their academics, I feel more well rounded in a professional sense. I so often go through my routine days in academia without so much as questioning the true intentions of my studies or what will be the inevitable benefits from my education. India helped me gain an understanding of issues which need to be faced on a global scale.*



# THE CALIFORNIA STATE UNIVERSITY - LOUIS STOKES ALLIANCE FOR MINORITY PARTICIPATION

## Alison Dawn Scott, BS Biology, Cal State LA, 2010

Alison (center) with Dr. Wanda E. Ward (left), former Acting NSF EHR Director and current Senior Advisor to the Director, and Dr. A. James Hicks (right), NSF-LSAMP Program Officer, at the 2008 orientation for LSAMP-INT



In Summer 2008, Alison was a participant in the inaugural group of 16 LSAMP students nationwide who participated in the NSF funded LSAMP Center for International Undergraduate Research Experiences (LSAMP-INT) program. In the LSAMP-INT REU, Alison conducted research at Universidad de São Paulo, Brasil with Dr. Hugo A. Armelin studying FGF2-triggered stress responses in malignant cells. Alison is currently a Ph.D. student in Botany at University of Wisconsin, Madison, where her research focuses on the evolutionary history of coast redwood trees (*Sequoia sempervirens*). Alison was recently named a recipient of the prestigious National Science Foundation Graduate Research Fellowship.



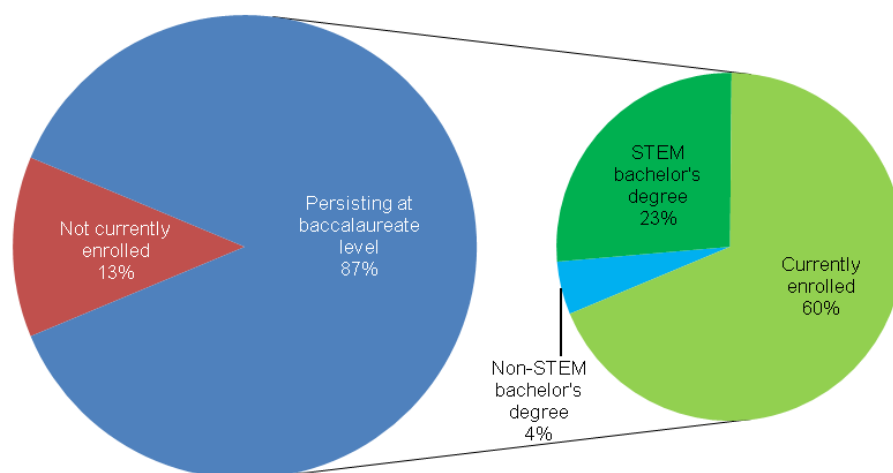
CSU-LSAMP at CSU Fullerton, under the direction of Dr. Christina Goode, developed a collaboration with Dr. Hans Dieplinger, Department of Genetic Epidemiology, Innsbruck Medical University, and Dr. Lukas Huber, Managing Director, Innsbruck Biocenter, Austria, which provides CSU-LSAMP students selected from throughout the Alliance the opportunity to conduct biotechnology research in their laboratories.

## INCREASING PROGRESSION TO GRADUATE STUDY

The Institute for Social Research (ISR) conducted a detailed analysis of the higher education persistence of students who participated in CSU-LSAMP during the Phase III project period, which began in Fall 2003 and ended in June 2008. The study was necessarily limited to students who could be matched by Social Security number to CSU system records and identified in the National Student Clearinghouse. Specifically, a total of 6,624 out of the 7,557 Phase III participants were tracked in the study. The analysis includes enrollment and degree data through June 30, 2008.

The ISR Phase III study found that 5,789 (87.5%) of the 6,624 tracked participants had either completed BA/BS degrees or were continuing in enrollment at the baccalaureate level. A total of 1,820 (27.5%) of the students had earned a BA/BS degree and 3,969 (59.9%) were still enrolled. Of the 1,820 BA/BS degrees awarded, 1,534 (84.3%) were in STEM. These findings are illustrated below in Figure 8 and Table 4 below.

*Figure 8. Baccalaureate Persistence of Phase III CSU-LSAMP Participants*



*Table 4. Baccalaureate Persistence of Phase III CSU-LSAMP Participants*

		Number	Percent			Number	Percent
Has Student Received a Bachelor's Degree?	Yes	1,820	27.5%		STEM	1,534	23.2%
					Non-STEM	286	4.3%
	No	4,804	72.5%		Currently enrolled	3,969	59.9%
					Not currently enrolled	835	12.6%
	<b>Total</b>	<b>6,624</b>	<b>100.0%</b>		<b>Total</b>	<b>6,624</b>	<b>100.0%</b>

The ISR study further showed that of the 1,820 Phase III students who completed bachelor's degrees, 786 (43%) persisted at the post-baccalaureate level (Figure 9 and Table 5 on the opposite page). Sixty-one (61) Phase III students had earned graduate degrees, and 44 of these graduate degrees were in STEM disciplines. Among students who completed bachelor's degrees but who have not yet obtained a graduate degree, 41% (725 out of 1,759) subsequently enrolled in and completed one or more terms of graduate study.

Figure 9. Post-Baccalaureate Degree Persistence of Phase III CSU-LSAMP Participants

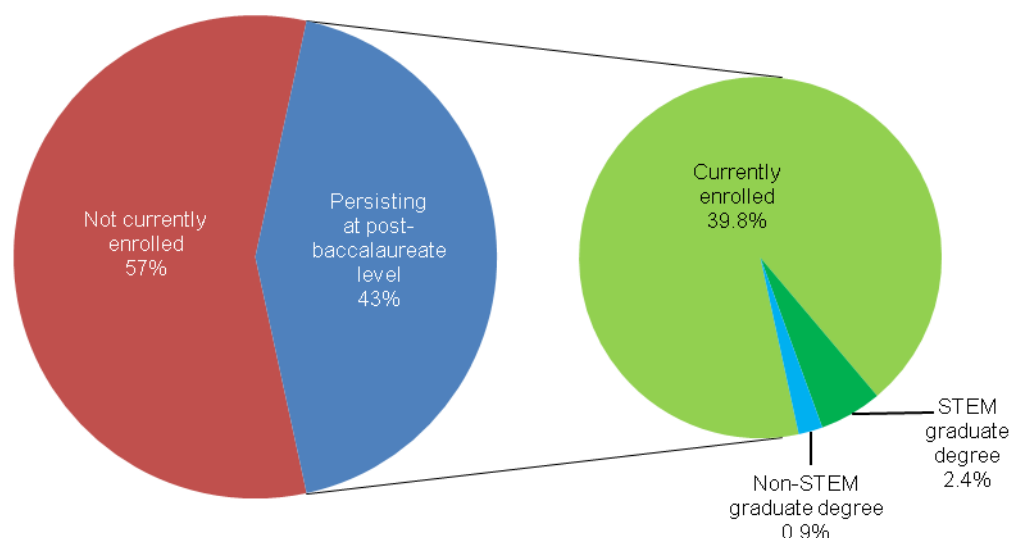


Table 5. Post-Baccalaureate Degree Persistence of Phase III CSU-LSAMP Participants

		Number			Number	Percent
Has Student Received a Graduate Degree?	Yes	61		STEM	44	2.4%
				Non-STEM	17	0.9%
	No	1,759		Currently enrolled	725	39.8%
				Not currently enrolled	1,034	56.8%
	<b>Total</b>	<b>1,820</b>		<b>Total</b>	<b>1,820</b>	<b>100.0%</b>

Table 6 below shows a further breakdown of the graduate degrees earned by Phase III students. Among the students who received a Master's degree, 71 percent (41 out of 68) were in STEM disciplines. All of the students who received doctorate degrees were in STEM disciplines.

Table 6. Highest Graduate Degree Earned by Phase III Participants.

	Number			Number	Percent
Master's	58		STEM Master's	41	67.2%
			Non-STEM Master's	17	27.9%
Doctorate	3		STEM Ph.D.	3	4.9%
			Non-STEM Ph.D.	0	0.0%
<b>Total</b>	<b>61</b>		<b>Total Graduate degrees</b>	<b>61</b>	<b>100.0%</b>

*Examples of Participants in CSU-LSAMP's Undergraduate Program who are Pursuing  
Doctoral - Level Study in STEM*



**Left: Jorge I. Medina. BS Physics & Astronomy, CSU Long Beach. 2009.** Jorge earned his BS in Physics and Astronomy, *magna cum laude*. He was on the President's List, in the Phi Beta Kappa Honors Society, and received a Boeing Undergraduate Research Scholarship. His research topic, under Dr. John Brevik of the Mathematics and Statistics department, was on a self-debugging algorithm for binary matrix. Jorge currently attends the University of Florida, where he is in the Ph.D. program in Chemistry, under Dr. Valerie Kleiman. Jorge was inspired to attend graduate school at UF during an LSAMP-sponsored conference he attended in Washington, DC, where he was introduced to the Dr. Kleiman's research. Jorge is a Bridges to the Doctorate Fellow at UF, and received an Honorable Mention for the NSF Graduate Research Fellowship.



**Above: Suzette Puente, BS Mathematics, CSU Fullerton, 2010.** Suzette is a graduate student in the six year MA/Ph.D. program in Statistics at the University of California, Berkeley, where she has a fully funded scholarship. As an undergraduate LSAMP student, Suzette conducted LSAMP-sponsored research with Dr. Sam Behseta of the Department of Mathematics analyzing data in an effort to develop statistical techniques that can be used to compare the firing patterns of neurons. Suzette published this work last year (2010) in the College journal *Dimensions*.



**Above: Andro Rios, BS Chemistry, CSU Sacramento, 2006.** Andro is currently a sixth year graduate student in the Ph.D. program in Organic Chemistry at the University of California, San Diego. His research area is synthesis of new fluorescent nucleosides. As an undergraduate, Andro demonstrated strong interest in both research and teaching. In addition to research, he served as a facilitator for LSAMP AEW's for organic chemistry. These dual interests have flourished at UCSD, where, as a "Socrates Fellow" funded by NSF's Graduate STEM Fellows in K-12 Education project, Andro was engaged in a year-long curriculum development project titled, "Life Is Organic Chemistry," which produced organic chemistry activity modules for use in high school biology classes.





**Above (Left): Stephanie Mendes, BS. Professional Chemistry, CSU Chico, 2009.** As an undergraduate LSAMP student, Stephanie conducted research on developing methods to monitor hydrothermal systems at Lassen Volcanic National Park. Stephanie is currently a National Research Council Ford Foundation Pre-doctoral Fellow in Earth Science at UC Santa Barbara, where she is conducting marine geochemistry research.



**Above (Right): Noella Gonzalez, BS Civil Engineering, Cal Poly Pomona, 2011.** Noella began her education at Cerritos Community College and transferred to Cal Poly Pomona in 2008. As an LSAMP research student, Noella conducted a Survey of Microfiltration Technologies in Southern California. The following summer she completed an REU at Drexel University's Engineering Cities Program where she carried out research on Design and Evaluation of Carbon Monoxide Interventions. Noella was accepted into a Ph.D. Program in Environmental and Water Resources Engineering at the University of Texas, Austin for Fall 2011.



**Left: Cindy Bick, BS Biological Sciences, San Jose State.** As a CSU-LSAMP student at San Jose State, Cindy conducted research with Dr. Leslee Parr on genetic identification of ghost shrimp source populations to California Estuaries. She participated in Duke University's NAPIRE program in Costa Rica, where she investigated the relationship of guild affiliation and morphometrics in Costa Rican bat species. Cindy is currently a Ph.D. student at University of Michigan, Ann Arbor in the Department of Ecology and Conservation Biology. Her research focuses on differential survival of Tahitian tree snails during a mass extinction event. Cindy was recently awarded an international fellowship by the University of Michigan to support her research at the London Zoological Society in the U.K.

## ECONOMIC IMPACT OF NSF'S INVESTMENT IN CSU-LSAMP'S UNDERGRADUATE PROGRAM

Although a detailed analysis of the economic impact of NSF's investment in CSU-LSAMP is beyond the scope of this report, it is important to comment on the economic benefit that is likely to accrue to students who, without the NSF's support of CSU-LSAMP, might not have completed a baccalaureate degree. It has been well established that average annual income and work-life earnings are positively correlated with level of educational attainment, and that differences in relative earnings by educational attainment have grown along with technological changes that require a more highly skilled and educated workforce. For example, the US Census, in its July 2002 report titled, *The Big Pay-off: Educational Attainment and Synthetic Estimates of Work-Life Earnings* (available at: <http://www.census.gov/prod/2002pubs/p23-210.pdf>), showed that the average annual earnings of year-round full-time workers holding a bachelor's degree in 1975 was 1.5 times that of those holding only a high school diploma; and that by 1999, the ratio had increased to 1.8. In this same report, the US Census calculated "synthetic estimates" of differences in average work-life earnings based on educational level over a hypothetical 40 year working life, and estimated that individuals with a bachelor's degree would earn an average of 2.1 million over their work-life, an amount that is about one-third more than workers who did not finish college and nearly twice as much as workers with only a high school diploma.

As noted elsewhere in this report, participation in CSU-LSAMP is associated with a substantially higher rate of baccalaureate degree completion. Therefore, an indicator of economic impact of NSF's investment in CSU-LSAMP is the added work-life income of students who might not have earned baccalaureate degrees were it not for their participation in CSU-LSAMP. To estimate the number of students who might not have graduated, the project's evaluator applied the estimated rate of STEM degree completion for URM non-participants who matriculated as STEM (which was 19.6%) to the total number of URM-STEM participants who matriculated as STEM (12,064). The actual rate of completion of STEM degrees by URM participants was 38.9%, for a total of 4,693 URM-STEM degrees. However, if participants had graduated at the same rate as non-participants, only 2,365 students would have earned STEM degrees, which is 2,328 fewer than the number who actually earned STEM degrees. Importantly, because of data and tracking limitations, this estimate only takes into account the 73% of URM participants who matriculated as STEM students, and does not include the 976 STEM degrees earned by the 27% of URM participants who did not have declared STEM majors when they entered the CSU. In addition, the estimate does not include the 3,202 non-STEM degrees earned by URM participants, or any of the degrees earned by non-URM participants. Therefore, the estimated number of students who might not have earned bachelor's degrees that is reported here is a low estimate.

To estimate the added earnings (and therefore, spending power) of the 2,328 students who might not have completed their STEM degrees, CSU-LSAMP has employed a method similar to the method used for assessing the direct economic impact of CSU alumni in the 2010 report, titled, *Working for California: the Impact of the California State University System*, prepared for the Office of the Chancellor of the CSU by ICF International (available at: <http://www.calstate.edu/impact/docs/CSUImpactsReport.pdf>). This method uses data from the US Census Bureau's 2008 Current Population Survey on average salaries for Californians at different levels of educational attainment and calculates the amount of earnings attributable to the student's CSU degree as the difference between the weighted average salary associated with an individual's final educational level minus the weighted average salary associated with their previous educational level. However, unlike the model referenced above, which considers age, gender, the historical mix of first time freshman and transfer students, and out-migration from the State in determining the total impact, the model greatly is simplified for the CSU-LSAMP to merely illustrate the kind of impact that a higher graduation rate has on work-life earnings.

Specifically, this simplified method uses the average annual earnings for baccalaureate holders in California (\$56,670) to calculate annual earnings of CSU-LSAMP URM-STEM graduates, regardless of age, gender or other factors, and subtracts the average earnings of Californians who have some college, but have not completed a degree (\$37,120). The difference between the two (\$19,950) is the estimated added annual income per student who might not otherwise have graduated. Assuming a 40 year work-life, this average difference, would amount an additional \$798,000 in work-life earnings for each student. Multiplying this amount by 2,328 (the number of students who would not have graduated with STEM degrees if the rate for URM CSU-LSAMP participants who matriculated as STEM were the same as the rate for non-participants) the total additional work-life earnings would equal \$1,857,744,000.

While the estimate of additional earnings as calculated above is hypothetical, it gives a sense of the magnitude of the economic impact that results when an investment is made in improving graduation rates. From 1993-2010, the NSF invested 15.6 million dollars in CSU-LSAMP's undergraduate program. And, we are confident that this investment will be returned over 100-fold in the increased earnings of students who would not have earned STEM degrees were it not for CSU-LSAMP. The CSU has also made a large investment in this effort, including the contribution of \$13.6 million in funds from the Chancellor's Office and at least this same amount from participating campuses over the same time period. If the NSF and the CSU investments in CSU-LSAMP over the past 17 years are combined for a total of \$42.8M, the return would be at least 43 times this investment solely in the enhanced earnings and spending power of these additional STEM BA/BS graduates. It is important to note that the analysis of additional earnings provided here does not take into account the fact that average annual earning in most STEM fields are greater than average annual earnings in non-STEM fields and that a substantial proportion (43%) of CSU-LSAMP baccalaureate recipients go on to pursue graduate study in STEM, further increasing their annual and work-life income. Although additional earnings and increased spending power of CSU-LSAMP graduates are substantial economic outcomes, CSU-LSAMP is keenly aware of the fact that increasing the number of URM-STEM graduates at the baccalaureate level and beyond has far greater economic impact. These are the graduates who are needed to produce a diverse and globally engaged STEM workforce to advance research, innovation and entrepreneurship in the nation's economy.

#### **SUMMARY OF ADDITIONAL WORK-LIFE EARNINGS ANALYSIS**

- If CSU-LSAMP URM-STEM participants graduated at the same rate as non-participants, 2,328 fewer URM students would have earned STEM degrees.
- The average annual income for a baccalaureate degree holder in California is \$56,670, as compared to \$37,120 for persons with some college but no degree, a difference of \$19,950 in annual earnings.
- Over a 40 year work-life, a baccalaureate degree holder is likely to earn \$798,000 more than a person with some college.
- CSU-LSAMP estimates that an additional \$1.8 billion in work-life earnings will accrue to URM students who might not have graduated with STEM degrees without NSF and CSU support for CSU-LSAMP.
- CSU-LSAMP estimates that NSF's investment of \$15.6 million in CSU-LSAMP's undergraduate program over the last 17 years will be returned over 100-fold in the increased earnings of additional URM-STEM graduates produced by CSU-LSAMP.
- CSU-LSAMP estimates that the combined NSF and CSU investment of \$42.8 million in CSU-LSAMP's undergraduate program will be returned at least 43-fold in the increased earnings of additional URM-STEM graduates produced by CSU-LSAMP.





GUY WEST FOOTBRIDGE AT CALIFORNIA STATE UNIVERSITY, SACRAMENTO



## IMPACT OF THE NSF'S SUPPORT OF CSU-LSAMP BRIDGE TO THE DOCTORATE ACTIVITIES

To date, the NSF-LSAMP program has supported eight CSU-LSAMP Bridge to the Doctorate (BD) Activities. A ninth BD Activity has been recommended to begin in Fall 2011. San Francisco State served as the Alliance's graduate institutional site for BD cohorts I and IV, CSU Los Angeles as the site for BD cohorts II, III, V, VI and VIII, and CSU Northridge was the site for BD cohort VII and will serve as the site for BD cohort IX.

CSU-LSAMP has consistently found that the BD model it has developed, which provides support at the Masters level, is a highly effective strategy for recruiting, retaining, and advancing talented minority students who otherwise would be unlikely to pursue doctoral level study. CSU-LSAMP BD fellows include students with deficits in their baccalaureate credentials and others with competitive credentials for direct entry into Ph.D. programs, but who were otherwise unable or hesitant to do so. For these students, the Masters-level program truly serves as a "bridge" to doctoral-level study. There are few national programs that target Masters-level mentoring and student development or that devote substantial resources to providing opportunities to students who have promise, yet might not be ready for successful application to Ph.D. programs. In this regard, the LSAMP BD activity, through its inclusion of large comprehensive universities, like the CSU, which grant only the MA/MS graduate degree but enroll far more students from URM groups than mainstream Ph.D. granting research universities, fills an important niche. These comprehensive universities are a rich, but insufficiently tapped, source of minority talent, and NSF's funding of the BD activity has enabled these institutions to play a more substantial role in bringing this talent to the doctoral-level research enterprise. In addition, set against the background of deteriorating State funding for public higher education and an increasingly competitive Ph.D. admissions environment, the NSF's support of the BD activity has become even more important to the production of a diverse STEM workforce at the doctoral level.

Although the developmental approach taken by CSU-LSAMP inevitably involves taking risks, CSU-LSAMP remains committed to the propositions that (1) given appropriate support, most students can be successful, (2) increasing the number of Ph.D. scientists and engineers who are from URM groups requires that "additional" students (i.e., students who are not already admitted to and engaged in Ph.D. programs) be recruited to and prepared for doctoral level study, and (3) broadening participation in the STEM professoriate and scientific leadership requires that a greater number of URM students be prepared for Ph.D. training at highly competitive research universities (i.e., Carnegie RU/VH or RU/H). Therefore, in each of its BD projects, CSU-LSAMP has made special efforts to sustain collaborations with RU/VH and RU/H institutions, which enrich the students' educational experience and facilitate their placement of BD students in Ph.D. programs at these institutions.

A total of 104 students have been participants in CSU-LSAMP BD activities. Of these students, 102 (98%) were students from historically underrepresented minority groups (80 Hispanic, 15 African American, 1 Alaska Native/ Native American, 3 Native Hawaiian/Pacific Islander, and 3 who self identified in more than one of the previous categories). Eighty-five percent (85%) of participants (88 out of 104) continued in STEM graduate study at least to the Master's level. Of these students, 18 students completed terminal Master's degrees and 9 of these students are known to be currently employed in STEM fields. Of the remaining 70 students, 34 are currently enrolled in STEM doctoral level programs, 1 has completed a STEM doctorate, 2 are currently enrolled in MD programs, 1 has completed the MD, 12 will be entering STEM Ph.D. programs in Fall 2011, and 20 will be continuing in Master's level programs at graduate institutional sites (the latter are primarily BD-VIII) students. To illustrate the impact that this NSF investment in Masters level study in the CSU has had on developing scientific talent for doctoral-level research, CSU-LSAMP has included the academic biographies of one BD Fellow from each Cohort year on the following pages.

## *Selected Profiles of CSU-LSAMP Bridge to the Doctorate Students*

### **Candice Price (BD Cohort I, San Francisco State University)**

**BS Math, CSU Chico, 2003; MA Math, SFSU, 2008; Ph.D. Candidate. Math, University of Iowa**



Candice joined the CSU LSAMP BD Activity at San Francisco State in 2004. She is now a Ph.D. candidate in Mathematics at the University of Iowa, planning to graduate in Spring 2012. At University of Iowa, she was awarded a GAANN Fellowship and an Alfred P. Sloan Fellowship. Candice's dissertation advisor is Professor Isabel Darcy and her research area is topology with an emphasis on knot theory and its applications in DNA topology. Candice spent the Spring 2010 semester at Mathematical Science Research Institute (MSRI) focused on Knot Floer Homology. At MSRI, she worked with Dr. Elisenda Grigsby, of Boston College, on applying knot Floer homology to problems in DNA topology. She also began an ongoing research project on virtual braid group with Dr. Lou Kauman through the "First Joint Meeting of the AMS and the Sociedad de Matematica de Chile. Candice was recently awarded an NSF-VIGRE traineeship, during which she planned a graduate student topology and algebra conference titled, "Underrepresented Students in Topology and Algebra Research Symposium (USTARS)." In 2011-2012, Candice will be attending the Institute for Mathematics and Its Applications in Minneapolis, Minnesota, for their annual program "Mathematics of Information."

### **Henry Paul Martinez (BD Cohort II, Cal State Los Angeles)**

**BA Chemistry, Cal State LA, 2002; MS Chemistry, Cal State LA, 2007; PhD Chemistry, UC San Diego, 2011**

Paul participated in an NSF REU program at Cal State, Los Angeles when he was a student at Glendale Community College. He transferred to Cal State Los Angeles, and continued his undergraduate research in Dr. Carlos Gutierrez' lab, working on synthesizing derivatives of the siderophore enterobactin as part of an effort to understand iron sequestration and transport by *E. coli*. In 2005, Paul was admitted to the MS Program and BD Cohort II Activity at Cal State Los Angeles, where he continued to work in Dr. Gutierrez' lab. Paul completed his MS in 2007, and was admitted to the Chemistry Ph.D. program at University of California, San Diego, where he joined Professor William Troglor's research group. His doctoral research, which was supported by NSF-AGEP and NCI-ET CURE fellowships, focused on new inorganic materials for chemical biological and environmental sensing. He has already published some of his graduate work, including a study on an ultrasound contrast marker for breast cancer, which was featured as the cover story of the journal (*Med. Chem. Commun.* **2010** 1, 266–270). Paul completed his doctorate in 2011, and currently is in a postdoctoral appointment at the Lawrence Livermore National Laboratories where he will work on the development of sensors.





## Selected Profiles of CSU-LSAMP Bridge to the Doctorate Students

### Vanessa L. Gonzalez (BD Cohort III, Cal State Los Angeles)

BS Marine Biology, UCLA, 2005; MA Biology, 2007, Cal State LA; Ph.D. Candidate, Harvard University

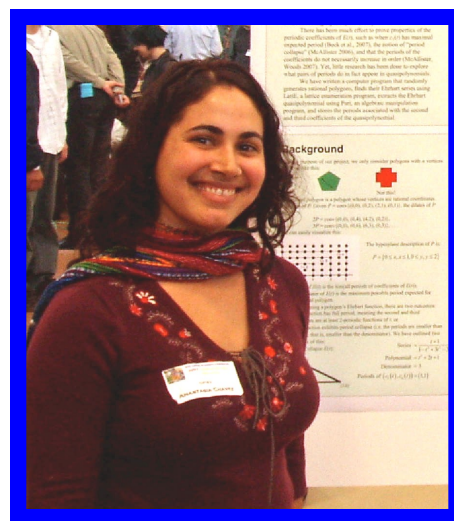


Vanessa began her academic career studying Marine Biology at UCLA. While in her third year she received a Smithsonian minority undergraduate research grant to study mechanisms of reproductive isolation in sea urchins at the Smithsonian Tropical Research Institute in Panama. While there she was introduced to molecular ecology and evolutionary biology. She was accepted into the Master's program in Biology and BD Cohort III at Cal State Los Angeles to further pursue training in evolutionary biology and systematics with Dr. Patrick Krug. Her Masters thesis research was on the evolution of bioluminescence in Cypridinidae (*Myodocopida*). Toward the end of her thesis research, she received another research grant to study the evolution of bioluminescence in Caribbean members of the Cypridinidae (*Myodocopida*) at the Smithsonian Tropical Research Institute in Panama. After completing her MS degree in 2007, she began her doctoral program at Harvard University, funded by the Graduate School of Arts and Sciences Graduate Student Fellowship. Currently, she is a doctoral candidate in the Department of Organismic and Evolutionary biology, and is completing her thesis research focusing on the evolution of the *Bivalvia* (Mollusca), funded by the NSF sponsored Assembling the Tree of Life Grant: *Bivalvia* Project.

### Anastasia Chavez (BD Cohort IV, San Francisco State University)

BS Applied Mathematics, SFSU, 2006; MA Mathematics, SFSU, 2010; PhD Candidate, UC Berkeley

Anastasia began her mathematical adventure at Santa Rosa Junior College, where she was inspired by her calculus teacher to pursue a BA degree in mathematics. After transferring to San Francisco State in 2003, she was awarded the Undergraduate Mentoring in Quantitative Environmental Biology (UBM) scholarship. Through UBM, Anastasia joined a mathematical ecology research team that used computer simulation and statistical techniques to analyze sampling methods in order to advise researchers of optimal choices in sampling methods. She earned her BS degree in applied mathematics from SFSU in spring 2006. Also that spring, Anastasia was accepted to the Master's program and BD cohort IV at SFSU. Anastasia earned her MA in Mathematics in summer of 2010. Her graduate study included completing a Master's thesis, titled "Bernoulli-Dedekind Sums," with Dr. Matthias Beck. Anastasia's thesis introduces a generalized Bernoulli-Dedekind Sum and uses a novel combinatorial approach to prove it satisfies a relationship called reciprocity. Anastasia's joint paper with Dr. Beck, "Bernoulli-Dedekind Sums" was published in *Acta Arithmetica*. Anastasia will begin the doctoral program in mathematics at UC Berkeley in fall 2011 funded by the prestigious UC Berkeley Chancellor's Fellowship.



## *Selected Profiles of CSU-LSAMP Bridge to the Doctorate Students*

### **Erika Francine Garcia (BD Cohort V, Cal State Los Angeles)**

**BS Biochemistry, Cal State LA, 2007; MS Chemistry, Cal State LA, 2009; Ph.D. Candidate. Cal Tech**



Erika entered California State University, Los Angeles in as an undeclared, first-time freshman, who was “leaning towards” a science major. As an undergraduate, Erika participated in the CSU-LSAMP Year Round Research Training program and eventually joined Dr. Frank Gomez’s research group. In 2007, she was admitted to the MS program in Chemistry and BD Cohort V to continue her work in Dr. Gomez’s lab. Her thesis focused on chemically robust microfluidic devices and applications. As a Master’s student, the Department of Inorganic and Analytical Chemistry at the University of Debrecen, Debrecen, Hungary sponsored the cost of Erika’s travel to Debrecen, Hungary for Erika to conduct Masters’ thesis-related research with Drs. Attila Gáspár, István Bácsi, and Mihály Braun on the topic of “application of external micro-spectrophotometric detection for microchips,” which resulted in a paper submitted for publication. Erika is currently a Ph.D. candidate in Materials Science at California Institute of Technology under the guidance of Dr. Harry Atwater. She is supported by a Cal Tech research assistantship. Her research focuses on developments in flow-based fiber optic detection on a microfluidic format. Erika plans to continue a career in the field of Material Sciences in an industrial or university setting.

### **Corey Earleon Baker (BD Cohort VI, Cal State Los Angeles)**

**BA Computer Eng, San Jose State, 2008; MS Electrical Eng. Cal State LA, 2010; PhD Candidate, U. Florida**

Corey began his engineering studies at the San Jose State University where he received the Hewlett Packard Scholarship. Corey entered the Master of Science program in Electrical Engineering at Cal State, Los Angeles in 2008 and joined BD Cohort VI. During his first year at Cal State Los Angeles, Corey served as Regional Chairperson for the National Society of Black Engineers. He also began to conduct research with Dr. Deborah Won at Cal State Los Angeles and worked on a separate project with Dr. Francisco Valero-Cuevas at the University of Southern California. Corey’s work with Dr. Won focused on neuron simulation data in matlab and varied tuning widths and angles of sorted and non-sorted populations to compare information loss. His thesis work with Dr. Valero-Cuevas titled, “*Design and Implementation of a Non-Linear Dynamical System Replicating Spring Buckling Behavior*,” focused on taking a linear motor and making it have non-linear behavior. The motor is to be used in place of a spring in Dr. Valero-Cuevas’ research to replicate the edge of instability of the nervous system. Corey is a Ph.D. student in Electrical Engineering at the University of Florida. He is a GEM Fellow and Intel Scholar, and is part of the Wireless Information Networking Group under the guidance of Dr. Janise McNair.



## *Selected Profiles of CSU-LSAMP Bridge to the Doctorate Students*

### **Evan Randles (BD Cohort VII, CSU Northridge)**

**BS Physics and Math, CSU Northridge, 2010; MS Math, 2011; Ph.D. Candidate, Cornell University**



Evan Randles came to CSU Northridge in 2006 as a returning transfer student double majoring in Mathematics and Physics and graduated Summa Cum Laude in 2010. The following fall, he was admitted to BD Cohort VII as Master's student in Applied Math, under the mentorship of Dr. David Klein. As a result of his hard work and determination he was able to complete his entire Masters program in one year, including his thesis: Spacelike Foliations of Robertson-Walker Spacetimes by Fermi Space Slices. During his tenure at CSUN he earned the following awards: Outstanding Graduate Student, Department of Mathematics, Heald Outstanding Graduating Senior Award, College of Science and Mathematics, John W. Nagle Outstanding Senior Award, Department of Physics and Astronomy, California State University, Northridge, Recipient 2010. Evan is currently in New York where he was admitted to Cornell University starting Fall 2011 to work toward his Ph.D. in Applied Mathematics. His research interests are analysis, probability, mathematical physics and general relativity. He also received a NSF 2011-2012 Research Training Group Graduate Assistantship in Probability.

### **Blanca Moreno-Hernandez (BD Cohort VIII Cal State Los Angeles)**

**BS Chemistry, University of California Los Angeles (UCLA); Masters Candidate Cal State Los Angeles**

Blanca's interest in science started with her first chemistry class at Santa Monica Community College; her interest in research began when she transferred to UCLA in 2007 and joined CAMP, the UC-LSAMP Alliance. Blanca's academic achievements won her the *Osher Transfer Scholar* award for two consecutive years. In her first academic year at UCLA, Blanca conducted biochemistry research with Professor Gloria Turner. She subsequently joined the organic chemistry group of Dr. Miguel Garcia-Garibay, where she studied the photochemical decarbonylation of diphenylcyclopropenones. At UCLA, Moreno was an NIH trainee in the Minority Access to Research Careers program. She received the *Geissman Award for Excellence in Organic Chemistry* on graduation in 2010. Blanca is currently a CSU-LSAMP Bridge to the Doctorate Cohort VIII Fellow at Cal State Los Angeles, working towards the MS in chemistry in preparation for Ph.D. work. Her thesis research under the supervision of Dr. Matthias Selke focuses on the chemistry of singlet oxygen with metal thiolate complexes. Blanca intends on establishing a career in chemistry research in industry or academia after completing the Ph.D. She also hopes to become involved in efforts to encourage minority participation in science.





## CSU-LSAMP STATEWIDE LEADERSHIP AT CALIFORNIA STATE UNIVERSITY, SACRAMENTO



**Dr. Alexander Gonzalez**  
President  
California State University, Sacramento



**Dr. Joseph Sheley**, Principal Investigator  
Provost and Vice President for Academic Affairs  
California State University, Sacramento



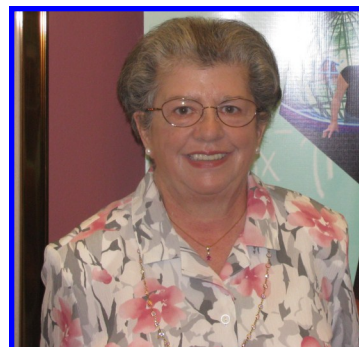
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THE CALIFORNIA STATE UNIVERSITY - LOUIS STOKES  
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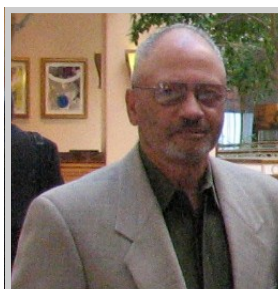


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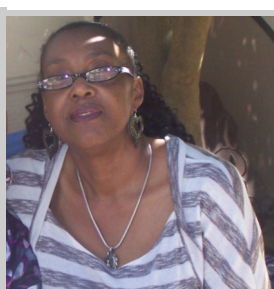
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## INTRODUCTION TO INDIVIDUAL CAMPUS PAGES

With a state as diverse as California, it's no surprise that each campus of the California State University system is unique in terms of the makeup and needs of its student body. Campuses range widely in size from a student body of just 3,800 at CSU Channel Islands to almost 37,000 students at CSU Fullerton. The California State University serves both large metropolitan areas such as Los Angeles and San Francisco and rural areas such as Stanislaus and Humboldt counties. Fourteen of the 23 campuses in the system are designated as Hispanic Serving Institutions. The CSU-LSAMP Alliance is designed so that each campus can provide a set of activities that best serves the needs of its students while maintaining the central mission of broadening participation in STEM. The success and unique character of each of the individual campus LSAMP programs is due to the dedication and hard work of a team of LSAMP campus coordinators. Each campus coordinator has provided a statement of the impact of LSAMP on their campus. These statements are included in the following pages.





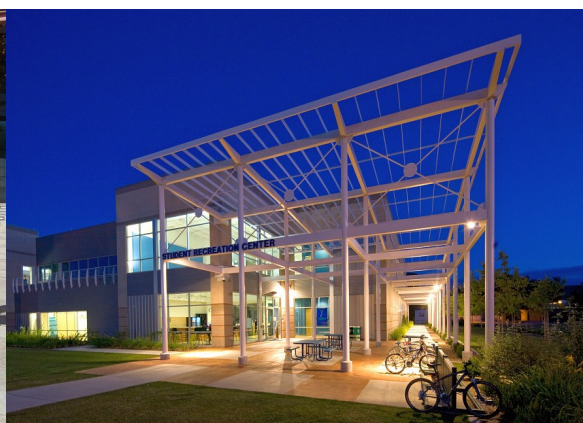
CSU Bakersfield

## CAMPUS DESCRIPTION

The Bakersfield campus is the only four-year degree-granting campus within a 100-mile radius. It serves the diverse population of the southern San Joaquin Valley and offers an extension campus in the Antelope Valley and programs in Hanford, Porterville, Santa Clarita, and Santa Maria. CSU Bakersfield is dedicated to advancing the many social, economic, political, and scientific issues affecting the region and the state. CSU Bakersfield enrolls 7,000-8,000 students annually. Reflecting the metropolitan character of Kern County, CSUB is a richly diverse community. Of its annual enrollment, 40% self identify as Hispanic, 8% as African American, 1% as Native American, 8% as Asian or Pacific Islander, 31% as non-Hispanic White, and 2% as international students. An additional 10% identify other groups or decline to state.



**Left:** CSUB-LSAMP Mathematics Summer Bridge Program, 2006



**Right:** CSU Bakersfield Campus

## IMPACT OF LSAMP

CSU Bakersfield has been a member of the CSU-LSAMP Alliance since its inception in 1994. One of the early accomplishments of the CSU Bakersfield LSAMP program was the development of academic excellence workshops, institutionalized since 2005, attached to each of the pre-calculus and calculus courses offered by the campus. These workshops have proven to be highly effective in improving student success not only in pre-calculus, but also in subsequent calculus courses. Over the past four-years, the average pre-calculus passing rate for CSU Bakersfield LSAMP students has been about 80% whereas it has been 62% for non-LSAMP students. During the more recent project periods, the LSAMP program at CSU Bakersfield has contributed greatly to expanding opportunities for undergraduate participation in STEM research on the campus. For example, in the last three years, the LSAMP program at CSU Bakersfield has sent an average of 7 students to graduate school, 2 of whom enter doctoral programs each year.





Channel Islands

CALIFORNIA STATE UNIVERSITY

## CAMPUS DESCRIPTION

CSU Channel Islands, nestled in a picturesque setting five miles from the Pacific Ocean, is the newest CSU campus. With its student-centered focus, it has quickly become known for its high-quality interdisciplinary, multicultural, and international education. Undergraduate departments and teaching credential programs, as well as several master's degrees, offer a close-knit atmosphere in which students receive individual attention from caring and dedicated faculty and participate in research projects, curriculum development, and campus and community activities focusing on leadership, service, and personal and professional skills.

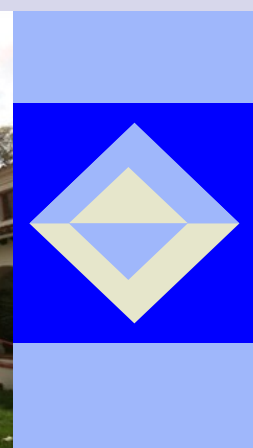
## IMPACT OF LSAMP

CSU Channel Islands joined the CSU-LSAMP Alliance in Fall, 2008. Early efforts focused on identifying and supporting talented STEM students facing educational barriers who were interested in pursuing graduate education. The CI-LSAMP Program instituted a vibrant biweekly seminar emphasizing professional development and opportunities. CI-LSAMP emphasizes matching LSAMP students with faculty mentors to work on long-term research projects. This effort, in conjunction with other parallel campus initiatives, has had a significant impact on the development of the university faculty and administration's understanding and valuing of faculty-mentored undergraduate research. Several STEM faculty have built on lessons learned mentoring LSAMP students to win significant external grants (two NSF CAREER grants; an NSF-REU, several CSUPERB grants, etc.). As LSAMP students participate in these research programs, the feedback loop is strengthened. In Spring 2011, over 80% of the junior/senior LSAMP students were engaged in an ongoing research project. LSAMP has helped the campus embrace its recent HSI designation while identifying yet more effective ways to serve our community and provide educational opportunities for all students.



**Top:** CSUCI-LSAMP Mathematics Summer Bridge Program, 2006

**Bottom:** Science III Building at CSUCI.





## CALIFORNIA STATE UNIVERSITY, CHICO

### CAMPUS DESCRIPTION

California State University, Chico — commonly called “Chico State” — offers more than 100 majors and options. The main campus is situated on 119 acres in downtown Chico, but Chico State also owns a 1,050 –acre farm and five acres of off-campus dorms about one mile from the main campus. The University also manages 3,950–acre Big Chico Creek Ecological Reserve, the 300–acre Butte Creek Ecological Reserve. Chico State ranked sixth among master’s level public universities in the western United States in the 2011 edition of “America’s Best Colleges” from *U.S. News & World Report*.



**Top:** Summer 2010  
Calculus Boot Camp  
participants at entrance to  
Chico State



**Right:** Kendall Hall, Chico  
State Administration Building

### STUDENT SPOTLIGHT: VERONICA GUZMAN



**Veronica Guzman** was a transfer student in the CSUC-LSAMP Summer Calculus Boot Camp 2005. She earned several Academic Awards for calculus. She also served as a facilitator in two calculus workshops for three semesters. She went to conferences and attended the California Forum for Diversity in Graduate Education. She became a CSU -LSAMP Student Scholar in 09-10. The LSAMP office at Chico helped her with letters of recommendation and graduate school fees. She was in the pilot Grad School Prep course in spring 2007. Veronica graduated in spring 2011 with a Bachelor of Science degree in Electrical Engineering with a minor in Computer Engineering. Veronica continues her education at CSU, Long Beach in the Electrical Engineering Master's program.

### IMPACT OF LSAMP

The California State University, Chico, LSAMP program's emphasis is on strengthening problem-solving skills and building proficiency in all academic areas. The goal is academic excellence through creating pathways to success for participants. Students primarily enter the program through the annual Summer Calculus Boot Camp. Students are supported with texts, supplies, research opportunities, graduate school preparation, and workshops for college credit. Forbes Magazine recently listed CSU Chico among America's 20 best colleges for minorities in STEM, due in no small measure to the proven effectiveness of the LSAMP program. Dr. Margaret Owens, the Dean of the College of Natural Sciences, credits the LSAMP Summer Calculus Boot Camp for this efficacy. Students in the Summer Calculus Boot Camp experience an intensive immersion in pre-calculus mathematics while learning to collaborate in problem solving and building an academic micro-community of mutual support. 1<sup>st</sup> and 2<sup>nd</sup> year retention rates and five and six year graduation rates are better than those of the CSU system-wide population, Chico State population, STEM majors, and minority students in general.



# California State University DOMINGUEZ HILLS

## CAMPUS DESCRIPTION

California State University Dominguez Hills (CSUDH) is located in the city of Carson and serves the communities of Los Angeles' South Bay. As an urban public university, the on-campus diversity is mirrored by the diversity of the surrounding communities, and CSUDH is among the most diverse campuses in the country. It is both a Minority-Serving Institution (MSI) and a Hispanic-Serving Institution (HSI). As an institution of higher learning, CSUDH strives to prepare students to live, work and learn as active and contributing members of a global society, within an urban context; and develop students' skills and knowledge in critical STEM areas key to competing in the 21st century.

## IMPACT OF LSAMP

Due to its mandate to broaden participation in all STEM fields, LSAMP is often the first such program that students come across at CSU Dominguez Hills. Summer and academic year science and mathematics workshops in gatekeeper courses have been the traditional mechanism by which students begin participating in LSAMP activities at CSUDH. Workshops, led by student facilitators, form an integral component of student learning and student mentoring in key science and mathematics classes. The workshops have been so successful in improving the performance of students in gatekeeper courses that they have been institutionalized by the university. LSAMP-supported activities have provided opportunities and funding for CSUDH students to conduct research in STEM fields. Research has included laboratory-based, theoretical and field research, and includes a very popular international research activity where LSAMP students conduct ecological research at the La Selva Biological Station in Costa Rica. LSAMP students from CSUDH have presented their work at conferences, and some have published their work in internationally recognized, peer-reviewed journals. The LSAMP at CSUDH has also supported activities designed to assist students interested in attending graduate school. This includes a GRE workshop which is an intensive activity designed to help students improve their GRE scores, and a Graduate School workshop where an expert professional leads the students through the mechanism of applying to graduate school and maximizing one's chance of gaining admission.



**Top:** CSUDH LSAMP students at La Selva Biological Research Station in Costa Rica, Summer 2010

**Middle:** New library addition

**Bottom:** LSAMP Chemistry workshop students 2008



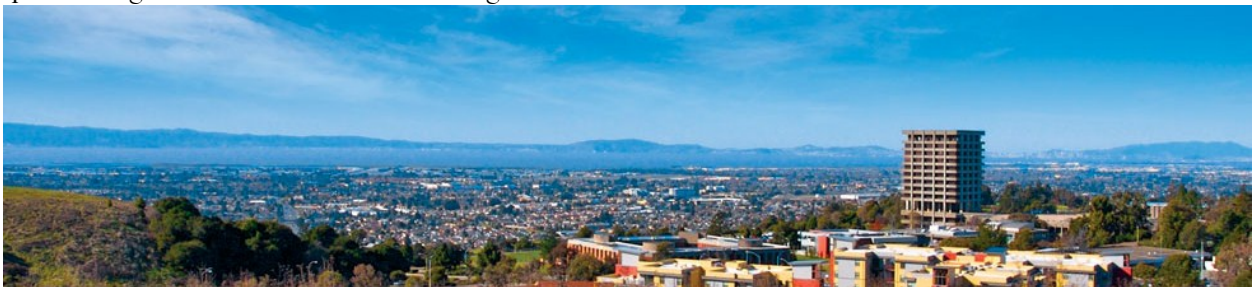


# CALIFORNIA STATE UNIVERSITY

## E A S T B A Y

### CAMPUS DESCRIPTION

California State University, East Bay (CSUEB) is known for award winning programs, expert instruction, small classes, a highly personalized learning environment, and a choice of more than 100 career-focused fields of study. In Fall 2010, the enrollment at CSUEB was 12,889 with a student-to-faculty ratio of 18-to-1. The University attracts students from throughout the region and state, as well as from more than 80 countries around the world. Named a "Best in the West" college and a "Best Business School" by the influential *Princeton Review*, CSUEB offers a nationally recognized freshman year experience, award-winning curriculum, personalized instruction, distinctly pragmatic and applied learning, and expert faculty. Students choose from among more than 100 professionally focused fields of study for which the University confers bachelor's and master's degrees. Today, the University is among the region's foremost producers of teachers, business professionals and entrepreneurs, public administrators, literary and performing artists, and science and math graduates.



**Above:** View of the CSUEB Hayward campus and the San Francisco Bay from the Hayward hills

### IMPACT OF LSAMP

At CSUEB, the focus of the LSAMP program has been to support student researchers as they work closely with faculty on current research projects in a variety of STEM fields. Concentrating resources in this way allows for provision of significant financial resources to students, many of whom would be unable to continue in school without that support. Furthermore, recent studies have shown that involving students in research increases retention rates and graduation rates. The focus on LSAMP funding for student research participation at CSUEB provides hands-on involvement in current research projects and opportunities to work closely with faculty. This in turn allows a strong mentor-mentee relationship to be forged; provides access to the scientific method in a meaningful and contributory way; provides opportunities to author and present findings at professional conferences and provides an entrance into scientific and professional communities; engenders enthusiasm and aptitude for conducting independent research, and makes pursuit of a graduate degree a desirable and attainable goal. Combined, these opportunities and experiences provide a strong STEM foundation to LSAMP students.





## CAMPUS DESCRIPTION

California State University, Fresno was founded as Fresno State Normal School in 1911, became a teacher's college in 1921, and has offered advanced degrees since 1949. The university's popular nickname is "Fresno State". Fresno State's 388-acre main campus and its 1,011-acre University Farm are located at the northeast edge of Fresno, California, at the foot of the majestic Sierra Nevada mountain range. The surrounding San Joaquin Valley is one of the richest agricultural areas in the world, and Fresno is the sixth largest city in California. Fresno State, one of the most diverse major universities in the United States, enrolls over 21,500 students annually. Of its annual enrollment, 36% self-identify as Hispanic, 5% as African American, 1% as Native American, 14% as Asian, 33% as non-Hispanic White, 2% as international students, and 9% identify as other or decline to state.

## IMPACT OF LSAMP

Fresno State has been a member of the CSU-LSAMP Alliance since 1994. Academic Excellence Workshops (AEW) were established by the program early on and continue to make a positive impact. AEWs are designed to help students reinforce their learning of subject material in "gatekeeper" science and math courses through facilitator-led sessions. Student facilitators (often LSAMP participants) work closely with faculty who provide input on workshop material. These sessions emphasize group problem-solving and study techniques. Over the years, workshops have been offered in Calculus I and II, Inorganic Chemistry, Organic Chemistry, Physics, and Biology. Historically, the average course grade for students who participate in AEW is higher than the average course grade of the class. For example, in a comparison over a five year period (fall 2005 through spring 2010) AEW participants overall averaged 0.40 grade points higher in courses as compared with the general course average. Additionally, the Fresno State CSU-LSAMP program has played a significant role in undergraduate research in the STEM fields with 85 LSAMP students participating in the year-round LSAMP Research Internship, in collaboration with STEM faculty, since 2004. Furthermore, the LSAMP program at Fresno State has made a significant impact on the number of students who have been able to attend scientific conferences and graduate preparation activities.



**Above:** Henry Madden Library

**Below:** Fresno State coordinator Lilia DeLaCerde (left) with LSAMP students at the Graduate Diversity Forum at the University of Southern California in 2011





# CALIFORNIA STATE UNIVERSITY FULLERTON

## CAMPUS DESCRIPTION

California State University Fullerton (CSUF) is the largest of the CSU system's 23 campuses in terms of enrollment (35,590 enrolled in Fall 2010). The diversity of the student body reflects the campus location in Orange County, a technologically rich and culturally vibrant area of metropolitan Los Angeles, with 30% of students identified as Hispanic and 21% as Asian/Pacific Islander. *Hispanic Outlook in Higher Education* (May 2010) ranked CSUF first in California and fifth in the nation among top colleges and universities awarding bachelor's degrees to Hispanics, based on 2010 data from the U.S. Department of Education. More recently (June 2011) the Washington, D.C., based Education Trust completed the first-ever analysis of federal net-price data (drawn from the Integrated Postsecondary Education Data System) and reported that CSUF is a national leader in price, quality and accessibility and one of only five of the nation's nearly 1,200 four-year colleges and universities doing a good job of serving low-income students.

## IMPACT OF LSAMP

CSU Fullerton has been a member of the CSU-LSAMP Alliance since 1994. The major focus of the CSUF LSAMP program during Phases I-III was on improving math skills of incoming STEM students through a Summer Bridge Math Institute and Academic Year Workshops. In the final years of Phase III the Summer Bridge was no longer offered and the AY workshops were institutionalized through the Math department. Early results show that in mathematics, the improvement in GPA as a result of participation in the math workshops is 0.50 going from 1.90 to 2.40, and the passing rate for SI participants is 82% versus 69% for non-participants. During the 2010/2011 academic year, LSAMP funded SI workshops in Chemistry and a new Physics SI workshop in the spring, which will be offered again in Fall 2011. More recently, the major focus at CSUF has been on increasing the preparedness of our students to go on to graduate programs in STEM. Workshops have been introduced on Science Writing (co-sponsored with HHMI), Presentation Skills, Statistics, and Library Skills (data mining) as well as a College funded GRE workshop. The number of students engaged in basic research has steadily increased and using LSAMP funding together with institutional support, CSUF supported the research activities of 23 students in the most recent year of funding.



**Above:** CSU Fullerton Campus

**Below:** Bridgett Santos, CSUF LSAMP student, conducting biological research in the lab of Dr. Robert Koch.

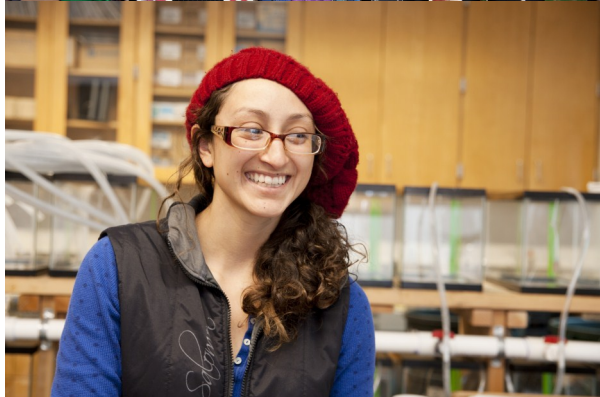






## CAMPUS DESCRIPTION

Since 1913, Humboldt State University (HSU) has been a jewel along California's Redwood Coast. No other university is quite like it. HSU is located in Arcata, California approximately 270 miles north of San Francisco and 95 miles south of the Oregon border. The campus includes 144 acres of land which is nestled in a spectacular setting of redwood forests, rushing rivers, ocean beaches and mountain ranges. An additional 591 acres which HSU owns, leases or has use agreements to include: marine lab, observatory, natural history museum, salt water marsh, freshwater marsh, small lakes and ponds, forest lands, sand dune preserve, research vessel, First Street Gallery, and the Wildlife Care Facility.



## IMPACT OF LSAMP

Humboldt State University has been a member of the CSU-LSAMP Alliance since its inception in 1994. One of the early accomplishments of HSU LSAMP was the development of supplemental instructional courses (SI's) offered to underrepresented as well as all students. Student Affairs has noted the increase in URM- STEM student achievement as a result of the supplemental and peer instruction students receive during the semester and have institutionalized the offering and financial support of SI's. Since early 2011, the CSU-LSAMP program at Humboldt State University has joined forces with the Indian Natural Resource Science and Engineering Program (INRSEP) under the leadership of Dr. Jacquelyn Bolman. INRSEP supports American Indian, Alaskan Native and Native Hawaiian students directly as well as being the home for the INRSEP-affiliated Society for the Advancement of Native Americans and Chicanos in Science (SACNAS) Chapter. INRSEP has also expanded the academic support services to all underrepresented students with a major in the College of Natural Resources and Sciences (CNRS) through HSU LSAMP. The College of Natural Resources and Sciences has established "diversity" in the sciences as a priority.

**Top:** HSU Campus in the early evening  
**Middle:** INRSEP & LSAMP Graduates May 2011  
**Bottom:** Recent graduate Rosalinda Gonzalez received a 2011 NSF Graduate Research Fellowship



## CALIFORNIA STATE UNIVERSITY LONG BEACH

### CAMPUS DESCRIPTION

Known nationally as "The Beach," CSU Long Beach (CSULB) overlooks the Pacific Ocean. Its 322-acre campus is designed to encourage student involvement and success. Eighty buildings housing 63 academic programs harmonize with master-planned architecture, landscape and environmental sculpture. Specialized instruction facilities support the sciences, engineering, nursing, computer studies, research centers and more. While a large urban university, CSULB offers an environment that encourages small group identification and personal privacy in the midst of 40,000 persons sharing the same campus. Cal State Long Beach is one of just five universities in the nation recognized for quality, affordability and access in a new report by The Education Trust. A new *Chronicle of Higher Education* report names CSULB among the best public institutions in the nation in improving student graduation rates.



**Left:** LSAMP students on GDEP fieldtrip in Palos Verdes with Geology Professor Greg Holk, 2009



**Right:** CSULB campus

### IMPACT OF LSAMP

California State University, Long Beach, has been a member of the CSU-LSAMP Alliance since spring 1994. As the program has changed and grown, one of the commitments of CSULB to the LSAMP program is the development of partnerships with different entities on campus. Although housed in the College of Natural Sciences & Mathematics, the LSAMP program has worked to create open lines of communication for recruitment in the College of Engineering, which houses Engineering and Computer Science/Engineering majors. CSULB-LSAMP has also partnered with the Geology Diversity Enhancement Program (GDEP), which has hosted LSAMP participants on field trips to Southern California locales to enhance classroom learning with real-world application. In recent years, increased focus on development of research experiences on campus has led to both a broadening of research participation and increased partnering with research based programs, such as the NIH-funded Bridges to the Baccalaureate on campus. In addition, CSULB hopes to further increase the development of transfer student-specific programming.





## CALIFORNIA STATE UNIVERSITY LOS ANGELES

### CAMPUS DESCRIPTION

Cal State L.A. has been a dynamic force in the education of students, setting a record of outstanding academic achievement for more than 50 years within the California State University system and beyond. Students, taught by nationally and internationally-recognized scholars in their fields, have gone on to become the nation's legislators, educators, engineers, healthcare providers, leaders in business and industry, and scientists. Serving approximately 21,000 students primarily from the greater Los Angeles area, CSULA has more than 215,000 alumni. The university awards more bachelor's degrees to Hispanics than any other California college or university. Of its annual enrollment, 49% self identify as Hispanic, 7% as African American, less than 1% as Native American, 18% as Asian or Pacific Islander, 10% as non-Hispanic White, 6% as international students, and 10% identify other groups or decline to state.



**Left:** Annenberg  
Wallis Integrated  
Sciences Complex

**Right:** ~1/3 of the  
LSAMP Year-  
Round Research  
Trainees in Spring  
Quarter, 2011



### IMPACT OF LSAMP

Cal State LA has been a member of the CSU-LSAMP Alliance since its inception in 1994. CSU-LSAMP has provided the opportunity for many SEM students to learn about research careers, investigate ongoing research, and engage in team research projects through our LSAMP year-round research training curriculum. The research program during the academic year includes a three-quarter series of courses designed to include students who have had no prior research experience. The first quarter focuses on understanding research careers and the numerous opportunities available in SEM disciplines. The second quarter focuses on on-going research in SEM fields. The third quarter focuses on conducting team research in a specific SEM sub-discipline. The summer term and following academic year provide an opportunity to continue a research project with faculty supervision and provides funding opportunities for students to participate in local and national research conferences. Each quarter students must submit a written scientific paper and give oral and poster presentations. All students apply for summer internships and research programs before the end of their participation in the program. For the graduating seniors in 2009-2010 who participated in the LSAMP Year-Round Research Training Program between 2003 and 2008, 81% were admitted to graduate school.



# CALIFORNIA STATE UNIVERSITY Monterey Bay



**Above:** The Tanimura & Antle Family Memorial Library

## CAMPUS DESCRIPTION

California State University Monterey Bay (CSUMB) was established in 1994 with a vision to serve the "diverse people of California, especially the working class and historically undereducated and low-income populations". The 1,387-acre campus, which was formerly the Fort Ord Army Base, is located one mile from the shores of Monterey Bay. CSUMB is a Hispanic-Serving Institution (HSI) with an enrollment of 4,800 students, 92% of whom are undergraduates. Mirroring the demographics of our region, 34% of the undergraduate population comes from historically underrepresented groups, 47% are first-generation students, and 30% are low-income. The university offers 21 majors, including new majors in Biology and Marine Science, and is known for its outcomes-based educational model and strong emphasis on hands-on, inquiry-based curriculum.

## IMPACT OF LSAMP

CSU Monterey Bay joined CSU-LSAMP in 2004. From the outset, the program received tremendous support from faculty and campus administrators, and has had a lasting impact on STEM programs. The much-needed financial and programmatic support of STEM achievement and retention planted the seed for similar, grant-funded projects and STEM-specific services in tutoring, course support, research experiences, and internships. LSAMP's emphasis on graduate school preparation and undergraduate research has been particularly transformative for CSUMB. The program led to increased faculty support of undergraduate research and spurred the development of graduate school preparation curriculum and workshops. The number of students going on to STEM graduate programs at institutions such as the University of California, Los Angeles and Texas A&M University has increased. Ultimately, the LSAMP program, together with other campus developments, led to the launch, in 2009, of the Undergraduate Research Opportunities Center (UROC), which is the first centralized undergraduate research office in the 23-campus California State University system. CSUMB continues to institutionalize LSAMP program elements through efforts such as the upcoming NSF-funded Council on Undergraduate Research Workshop on Institutionalizing Undergraduate Research for State Systems and Consortia.



**Above:** Biology major Jena Cleveland was a recipient of the CSU-LSAMP Community College Transfer Student Merit Award in 2008. She begins her Ph.D. research at UCLA in Fall 2011 with a Eugene Cota-Robles Fellowship, which provides four years of funding. She was also awarded a National Science Foundation AGEP Competitive Edge grant.



# California State University Northridge

## CAMPUS DESCRIPTION

California State University, Northridge (CSUN), with an enrollment of 35,198 students, is among the largest single campus universities in the United States. Celebrating its 50<sup>th</sup> anniversary in 2008, CSUN is the only four-year institution of higher education serving the San Fernando Valley in Los Angeles. With a population that is comprised largely of ethnic minorities, the San Fernando Valley is home to nearly 1.8 million residents, and accounts for roughly 37% of the City of Los Angeles population. This diversity is reflected in the student population at CSUN. Fall 2009 enrollments were 29.5% Latino, 11.1% Asian American, .5% Pacific Islander, 7.4% African American, 31.0% White, 0.3% American Indian, 6.6% International, and 13.6% Other.



**Above:** Jacaranda Hall CSUN Engineering & Computer Science Building

**Below Left:** Cassandra Williams and Kemella Sillah

**Below Right:** LSAMP Community College Outreach



## IMPACT OF LSAMP

The impact that LSAMP has had on the students at CSUN since 1994 has been great. Over the years, the LSAMP program at CSUN has offered many programs and activities to help students in rigorous STEM majors. Activities include Cooperative Learning Participation (guided group study) to reinforce course concepts, Summer Math Workshops to help advance students in math, numerous field trips to expand the horizons of students, opportunities for international experiences, and Peer Mentoring Programs to help new students adjust and persist. CSUN-LSAMP also encourages students to gain research experience under the mentorship of individual faculty members and present their work at national scientific conferences. LSAMP has allowed CSUN to show students the myriad of opportunities available for STEM majors and to provide the personalized assistance they need to accomplish their academic and career goals.



# CAL POLY POMONA

## CAMPUS DESCRIPTION

California State Polytechnic University, Pomona, better known as Cal Poly Pomona, is nestled in 1,438 acres on the eastern edge of Los Angeles County. As one of only seven polytechnic universities nationwide, Cal Poly Pomona is known for its learn-by-doing philosophy. The university recognizes that students who solve classroom problems today have an advantage as employees solving real-world problems tomorrow. Faculty in all disciplines apply theory to practice, creating opportunities for students to use their knowledge in hands-on projects, collaboration in research, and participation in valuable internships and service learning programs. Reflecting the metropolitan character of the area, Cal Poly Pomona is an ethnically diverse community. Of the 20,000 undergraduates and 2100 graduate students enrolled, over 40% are enrolled in STEM disciplines.



**Above:** Quest 2008 LSAMP Summer Program at Cal Poly Pomona

## IMPACT OF LSAMP

Cal Poly Pomona's MEP and SEES programs have been active participants in the LSAMP program since its inception in 1994. One of the early accomplishments of the LSAMP program was to incorporate Academic Excellence Workshops (AEW) developed and refined over the years by the Director of SEES and the Coordinator of MEP. Many of the CPP LSAMP activities designed to enhance student success and retention in STEM disciplines have been institutionalized or funded from other sources. These include tutoring (Math and Science Help), Summer Quest program, Academic Excellence Workshops (AEW) and facilitation of transition of community college students. Undergraduate research is perhaps the best known vehicle for retaining URM students in the STEM disciplines. Undergraduate students who participate in research are more likely to remain in school, to graduate within the STEM disciplines, to pursue advanced degrees, and to have successful STEM careers. Most departments in the Colleges of Science and Engineering now require research experiences, internships and senior projects for graduation. Currently, LSAMP students have been invited to participate in several activities sponsored by other programs including summer GRE and graduate preparation workshops, seminar series and other pre-professional training.

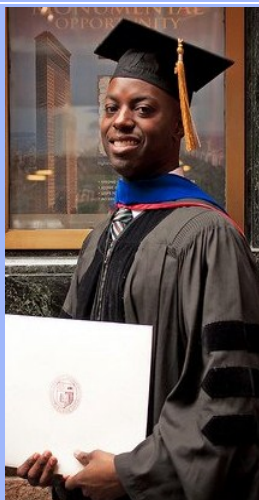


# SACRAMENTO STATE

*Leadership begins here.*

## STUDENT SPOTLIGHT: AMEER THOMPSON, PH.D.

**Ameer Thompson** started out at CSU Sacramento as a business major, but soon discovered that the world of science was the perfect niche for his intellectual interests, creativity, and personality. Once he became engaged in research, it was clear that he was on the path to graduate study and a productive career in research. Ameer participated in LSAMP graduate school preparation activities and was also a Ronald McNair Scholar. Ameer graduated from Sacramento State with a B.S. in Biological Sciences in 2005. He went on to the graduate program in Physiology, Biophysics and Systems Biology at Cornell University, where he earned his Ph.D. in 2011 and is currently a Postdoctoral Fellow. His research interest is the area of potassium channel regulation.



## CAMPUS DESCRIPTION

Located in the capital of the nation's most populous and diverse state, California State University, Sacramento (Sacramento State) is dedicated to advancing the many social, economic, political, and scientific issues affecting the region and the state. Sacramento State is the seventh-largest campus in the 23-campus CSU system, enrolling 27,000-28,000 students annually. Reflecting the metropolitan character of the area, Sacramento State is a richly diverse community. Of its annual enrollment, 16% self identify as Hispanic, 7% as African American, 1% as Native American, 20% as Asian or Pacific Islander, 43% as non-Hispanic White, 2% as international students, and 11% identify other groups or decline to state.

## IMPACT OF LSAMP

Sacramento State has been a member of the CSU-LSAMP Alliance since its inception in 1994. One of the early accomplishments of CSU-LSAMP was the development of an innovative alternative to the traditional 4 unit one-semester pre-calculus course offered by the campus. This alternative, which has been institutionalized, is a two-semester course sequence with attached workshops. The two-semester course has proven to be highly effective in improving student success not only in pre-calculus, but also in subsequent calculus courses. Over the past five-years, both the average pre-calculus grade and average grade in the subsequent Calculus I class for students taking the LSAMP two-semester course has been 0.84 grade points higher than the average grades in these course for students taking the traditional pre-calculus course. During the more recent project periods, the CSU-LSAMP program at Sacramento State has contributed greatly to expanding opportunities for undergraduate participation in STEM research on the campus.



**Left:** Sac State LSAMP Math Summer Bridge Class



## CAMPUS DESCRIPTION

A young, vibrant university, California State University, San Bernardino is one of the fastest growing universities in California, largely because of its expanding service area of San Bernardino and Riverside counties, which covers 27,000 square miles – a territory larger than 10 states in the nation. More than 65,000 students have graduated from CSUSB, including many who work in Southern California and make a major positive impact on the economy. Founded in 1965, CSUSB currently enrolls more than 17,500 students and employs more than 2,100 faculty and staff. The university's student population is one of the most diverse in California, with a student enrollment so diverse that there is no majority ethnic group on campus.

CSU San Bernardino LSAMP Math Summer Program Participants



## IMPACT OF LSAMP

CSU San Bernardino has been a member of the CSU-LSAMP Alliance since its inception in 1994. During the initial periods, the CSU-LSAMP program at San Bernardino introduced Academic Excellence Workshops (AEW) in Calculus and Science. The increased success of the LSAMP students participating in these workshops, led to the incorporation of the corresponding workshops to General Chemistry and Computer Science courses. It also led to the implementation of similar workshops for the Mathematics gateway proof courses. During the more recent project periods, CSU-LSAMP at San Bernardino has been one the most effective programs contributing to expanding opportunities for undergraduate participation in STEM research, both on the campus, and in other universities around the country.



### STUDENT SPOTLIGHT: MICHELLE STURGES

Michele Sturges is an undergraduate majoring in Biology and was also an LSAMP Scholar for the year 2010-11. Through her participation in LSAMP-sponsored activities, Michelle's desire to attend graduate school increased. Michele studied abroad in Turks and Caicos during the Summer of 2010. While there, she took a marine resource management course that allowed her to study the native coral reef population. She studied the effects the echinoderm had on the health of the coral and fish populations. The course was taught primarily in the water, while snorkeling and scuba diving. The research was done on site and made possible by LSAMP.





# SAN DIEGO STATE UNIVERSITY

## CAMPUS DESCRIPTION

San Diego State University is the oldest and largest higher education institution in the San Diego region. Since it was founded in 1897, the university has grown to become a nationally ranked research university. Each year, SDSU provides more than 35,000 students with the opportunity to participate in an academic curriculum distinguished by direct contact with faculty and an increasing international emphasis, preparing them for a global future. Overall, San Diego State students can choose from 85 undergraduate majors, 75 master's programs and 14 joint doctoral degree programs and two independent doctoral degree programs. Increasingly recognized for innovative research, San Diego State has achieved the prestigious designation of "Research University" with high research activity granted by the Carnegie Foundation. For the past two years, SDSU has ranked the No. 1 Research University for those with 14 or fewer Ph.D. programs according to Academic Analytic's faculty-scholarly productivity index.



San Diego State LSAMP students at SACNAS 2010 proudly "spelling" out LSAMP

## IMPACT OF LSAMP

SDSU has been a part of the CSU-LSAMP Alliance since the program began in 1994. From the early years, one of the strongest components of the SDSU LSAMP program has been its participation and collaboration with other science-based research programs housed within the College of Sciences in the Center for the Advancement of Students in Academia (CASA). It is through this collaboration that the university has institutionalized two key courses required for the LSAMP program research participants: Research Colloquium in the Biomedical Sciences and Responsible Conduct of Research. These courses were developed and are facilitated by the LSAMP, MARC, MBRS and McNair programs on campus but are open to all students. It is this collaboration that has facilitated the acceptance of well-prepared LSAMP students into programs like MARC and MBRS. LSAMP has contributed to the increased number of underrepresented minority students who have successfully matriculated into graduate programs in the STEM fields.



# SAN FRANCISCO STATE UNIVERSITY

## CAMPUS DESCRIPTION

San Francisco State University, located in one of the world's most vibrant and beautiful cities, is a recognized leader in addressing issues both global and close to home. In the global arena, typically SF State enrolls the largest number of international students at any comprehensive university in the U.S., and ranks second among U.S. universities for the number of students who study abroad for an academic year. With a diverse range of students from almost every state and nearly 100 countries, the University community is a perfect setting for learning to succeed in a pluralistic society and global economy. The highly diverse campus consistently ranks in the top 20 nationwide in awarding undergraduate degrees to minorities. SF State's pioneering commitment to community and civic engagement is prevalent throughout the curriculum. More than 500 courses combine academic study with community involvement, and the location in a center of business, technology and culture provides a laboratory for community-service projects, work-study opportunities and internships. The University has been named by Princeton Review one of 81 "Colleges with a Conscience," and is classified as one of the Carnegie Foundation's "Community Engagement" institutions.



**Above:** SFSU Math Summer Bridge Program Participants, 2009

## IMPACT OF LSAMP

After 14 years at SFSU the CSU-LSAMP program has had a lasting impact on the College of Science and Engineering. Along with the Student Enrichment Opportunities (SEO) program the LSAMP has become a focal point for under-served students majoring in STEM disciplines. In addition to providing academic and material support to its participants, LSAMP has provided an incentive for faculty participation and collaborations. Faculty regularly re-direct students to the LSAMP program for peer networking, tutoring, and academic advising.





# SAN JOSE STATE UNIVERSITY

## CAMPUS DESCRIPTION

Located in downtown San Jose, in a region of approximately two million people in the State of California, San Jose State University is the Metropolitan University for Silicon Valley and the first public university in California (founded in 1857). SJSU is the sixth largest campus of the 23-campus CSU System. SJSU's mission statement is "To enrich the lives of its students, to transmit knowledge to its students along with the necessary skills for applying it in the service of our society, and to expand the base of knowledge through research and scholarship." Fall 2010 enrollment was 29,076 students, of which 21% were Hispanic, 4% African American and 30% were Asian. SJSU was recently designated as a Hispanic-Serving Institution by the U.S. Department of Education.



### STUDENT SPOTLIGHT: JORGE DINIS

Jorge transferred to San Jose State University from Cosumnes River College, a Community College in the Sacramento Valley. He first became affiliated with the CSU-LSAMP program as an Academic Excellence Workshop facilitator for General Chemistry. Afterward, he was able to secure a MARC position and became research active with Dr. Cleber Ouverney characterizing uncultivated bacteria from environmental and human sources using molecular techniques. Jorge starts his doctoral studies at the University of Wisconsin, Madison in Fall 2011, with the assistance of an NSF Graduate Research Fellowship.

## IMPACT OF LSAMP

Over 250 STEM majors at SJSU are part of LSAMP and many others benefit from LSAMP funded activities which include Academic Excellence Workshops (AEW), Summer Preparation Courses, Research and the Graduate School Preparation Seminar (GSP). SJSU's LSAMP works in close collaboration with NIH MARC and RISE Programs as well as HHMI, S-STEM and STEP Programs making our program very student and research oriented. The AEW serve two purposes: they provide much needed support for gateway courses and the facilitators often develop a strong interest in academic careers, expressing a desire to continue to PhD degrees. The GSP Seminar has helped many students at SJSU learn about advanced degrees in STEM and funding opportunities. Over 40 SJSU URM and non-URM students who participated in this activity are currently in STEM PhD programs, 16 of these are former AEW facilitators. Seven of these students are NSF Graduate Fellows and one is a DOE Graduate Fellow.



### Scenes from the SJSU Campus

**Left:** Boccardo  
Gateway

**Middle:**  
Engineering  
building

**Right:** Smith  
Carlos Statue



# CAL POLY

## CAMPUS DESCRIPTION

Cal Poly is a nationally ranked, four-year, comprehensive public university located in San Luis Obispo, halfway between San Francisco and Los Angeles on California's Central Coast. It is a distinctive learning community, offering academically focused students a hands-on educational experience that prepares them for today's scientific and technical world. In addition to Cal Poly's 1321-acre main academic core, there are an additional 8,357 acres of rolling campus devoted to student farming, experimental architecture and other outdoor laboratory studies, making Cal Poly one of the largest campuses in the nation.

## IMPACT OF LSAMP

Cal Poly San Luis Obispo joined Phase IV of CSU-LSAMP in fall 2008 and the program now involves 150 underrepresented STEM majors. In summer 2011, eleven LSAMP students participated in research experiences and three additional students studied abroad. In Fall 2011, five engineering students will be studying engineering at Tecnum University in Spain and one mechanical engineering student will be studying at Munich University of Applied Sciences. Each year LSAMP students attend national conferences such as SHPE, SBES and Emerging Researchers



Cal Poly CSU-LSAMP Students



### STUDENT SPOTLIGHT: CRISTAL VASQUEZ

Cristal is a senior in mechanical engineering and is one of the Cal Poly recipients of the 2011-12 CSU-LSAMP Scholar's Awards. In the summer of 2009 Cristal conducted research at the *NASA Glenn Research Center in Ohio* and presented a research poster, "Ares V Advanced Composites Structural Analysis." Cristal spent the summer of 2010 at the Jet Propulsion Lab and then won second place at the annual SHPE Conference for the Technical Poster regarding "Development of a Highly Flexible Thermal Strap for the Portable Remote Imaging Spectrometer (PRISM)." Cristal attended Tecnum University of Navarra, San Sebastian, Spain, during Fall quarter 2010 where she took upper division classes, including one graduate class in Mechanical Engineering. Cristal plans to pursue a Ph.D. in Mechanical Engineering.



## California State University SAN MARCOS

### CAMPUS DESCRIPTION

California State University San Marcos was launched in 1989 and its first class (400 students) matriculated in the fall of 1990. The campus has expanded rapidly and during the 2010-11 school year nearly 10,000 students enrolled. CSUSM projects its enrollment to grow to 18,000 by 2020-21. The student body is diverse, comprised of 1 percent Native American/American Indian, 3 percent African American, 11 percent Asian/Pacific Islander, 26 percent Hispanic, and 47 percent Caucasian. The campus is located on 304 acres in North San Diego County, one of the fastest growing areas in California. CSUSM offers 28 undergraduate degree programs, 12 master's degree programs, and 1 joint doctoral degree program. Master's program offerings include Biology, Biotechnology, Nursing and Psychology. CSUSM's mission includes solid commitments to diversity, academic excellence, innovation, and community partnership.



#### STUDENT SPOTLIGHT: MICHAEL SANTANA

Michael began his Mathematics career at Cal State San Marcos. He was a recipient of the 2008-09 CSU-LSAMP Scholar award. Michael worked with Dr. K. Brooks Reid investigating several structural properties of irreflexive, asymmetric, complete relations on non-empty sets and in March 2009, presented his work at the 40th Southeastern International Conference on Combinatorics, Graph Theory and Computing. He completed his B.S. in Spring 2009 and joined the Master's program at CSUSM in Fall 2009. He was awarded the Research Initiative for Scientific Enhancement Graduate Fellowship in 2009 and the California Pre-Doctoral Scholarship in 2010. In 2011 Michael received Honorable Mention for the NSF Graduate Research Fellowship. Michael is first author on two manuscripts submitted for publication. He completed the masters program in Spring 2011 and will begin a doctoral program in mathematics at the University of Illinois at Urbana-Champaign in Fall 2011.

### IMPACT OF LSAMP

CSU San Marcos is one of the newer members of CSU-LSAMP, joining the alliance in 2008. Outreach efforts have increased awareness of LSAMP among faculty members who are encouraging their students to become involved in the program. This has led to the recruitment of a solid group of students, all dedicated to careers in science and technology. Over the past three years more CSU San Marcos students have become aware of STEM disciplines and careers because of LSAMP. LSAMP has also contributed to the increase in student participation in STEM research at CSU San Marcos and STEM summer programs around the states. The success of LSAMP at CSU San Marcos has led to current and former LSAMP students applying to, and being accepted into prestigious graduate schools across the nation.





## CAMPUS DESCRIPTION

Sonoma State University is a public, coeducational business and liberal arts college affiliated with the California State University system. Located in California's wine country one hour north of San Francisco, Sonoma State is a small campus with big ideas. The university offers over 65 undergraduate and graduate degree programs. The Sonoma State educational experience fosters intellectual, cognitive, social and personal growth. The faculty and staff provide close mentoring relationships and an education that explores ethical exploration, civic engagement, social responsibility, and global awareness combined with a solid foundation in an academic discipline. Many classes average fewer than 40 students, allowing close interaction between students and faculty.

Sonoma State has been regularly named a "Best Regional University" by *U.S. News & World Report* and has also been named one of the "most wired" campuses by *Forbes* magazine. It is the only California university invited to be a member of the Council of Public Liberal Arts Colleges, the prestigious group of 25 universities and colleges across the nation committed to providing superior liberal arts and sciences education to their students.



**Above:** Newly renovated Darwin Hall houses the School of Science and Technology

## IMPACT OF LSAMP

CSU-LSAMP has had a positive impact on SSU. It has helped increase the diversity of the student body by providing financial and academic support to underrepresented students, helping improve retention and graduation rates. LSAMP provides research stipends averaging \$1800 to promising students, allowing them to gain experience in independent research and helping to prepare them for graduate study. Additionally, the Academic Excellence Workshops that began with LSAMP were so successful they are now fully institutionalized.



### STUDENT SPOTLIGHT: JUAN MURILLO PACHECO

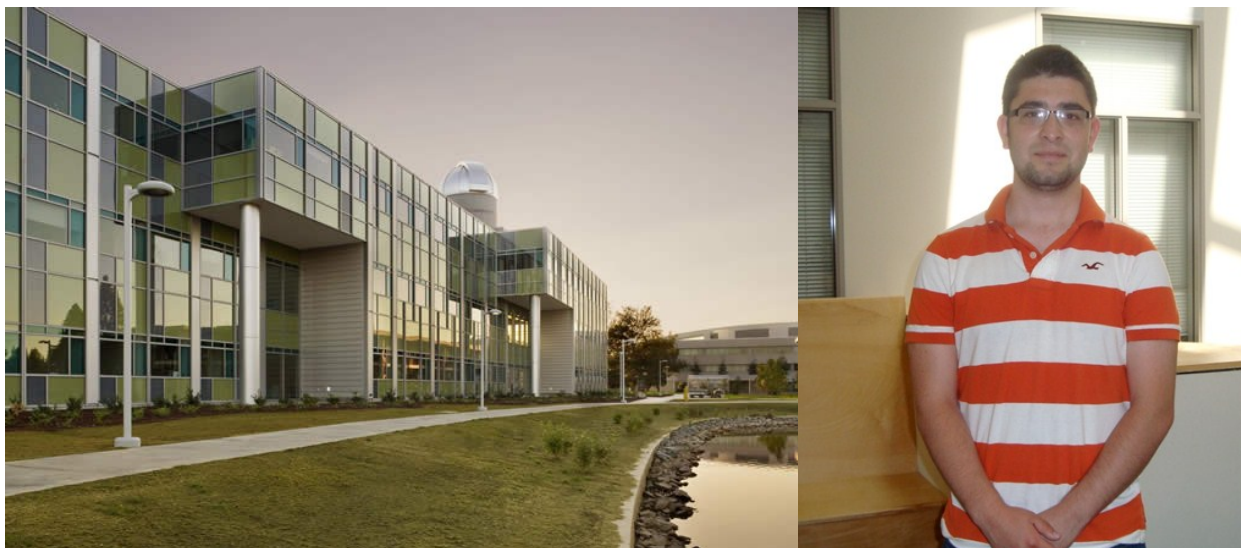
Juan graduated from SSU in the spring of 2010. Juan spent the first fifteen years of his life in Peru, where he attended school until the tenth grade. He then moved to Richmond, California. At his local community college, he had the opportunity to interact with students from all over the world. Attending a diverse campus made adjusting less frustrating, because the campus embraced multiculturalism and promoted respect for all peoples despite their backgrounds. During his college experience Juan has dealt with difficulties being a first generation college student, but persisted working towards graduation. Juan was admitted to the Ph.D. program in Mathematics at the University of Iowa and is currently continuing his studies there.



# California State University | Stanislaus

## CAMPUS DESCRIPTION

California State University, Stanislaus (CSU Stanislaus) is a designated Hispanic Serving Institution (HSI) that serves California's Central Valley and adjacent Sierra Nevada foothills. The vast majority of the University's enrollment comes from a six county region - Calaveras, Tuolumne, Mariposa, San Joaquin, Stanislaus, and Merced counties - that comprise 9,528 square miles. Of these counties, the latter three provide the majority of students to the University. Fall 2010, undergraduate enrollment totaled 6972 students, 45% of which were from Stanislaus County and 17% and 18% were from Merced and San Joaquin Counties, respectively. For fall 2010 enrollment, 0.8% self identify as American Indian, 10.3% as Asian, 2.9% as Black or African American, 31.9% as Hispanic or Latino, 1.0% as Native Hawaiian or other Pacific Islander, 1.6% as non-resident alien, 4.2% as two or more races, and 39.1% as White. First-time freshman enrollment in 2010 was 1029 students, approximately 43% of which were the first in their families to pursue higher education. Moreover, of those families of first-time freshman, over 70% were also considered first generation in that their parents reported only having "some college" experience.



**Left:** The new Science II building on the CSU Stanislaus Campus

**Right:** Rudolfo Lopez Jr. earned his B.S. in Physics in 2011 and plans to pursue a Ph.D.

## IMPACT OF LSAMP

CSU Stanislaus has been part of the CSU-LSAMP alliance since 1995. CSU-LSAMP was then, and continues to be now, a critical element in our recognition as a Hispanic Serving Institution (HSI). The program initially focused only on mathematics. Since 2005, a concentrated effort has broadened both the engaged student population and the discipline focus. CSU-LSAMP student research interns are now found in all five departments of the College of Natural Sciences and the number of research interns has increased from 2 or 3 per year to 10 to 15 per year. This has provided a much improved undergraduate research experience arena for the STEM disciplines on the CSU Stanislaus campus.



# **CALIFORNIA STATE UNIVERSITY LOUIS STOKES ALLIANCE FOR MINORITY PARTICIPATION**

## **I M P A C T   R E P O R T : 1 9 9 3 - 2 0 1 1**

### **A C K N O W L E D G M E N T S**

#### **T H E   C S U - L S A M P   C O M M U N I T Y - - P A S T   A N D   P R E S E N T**

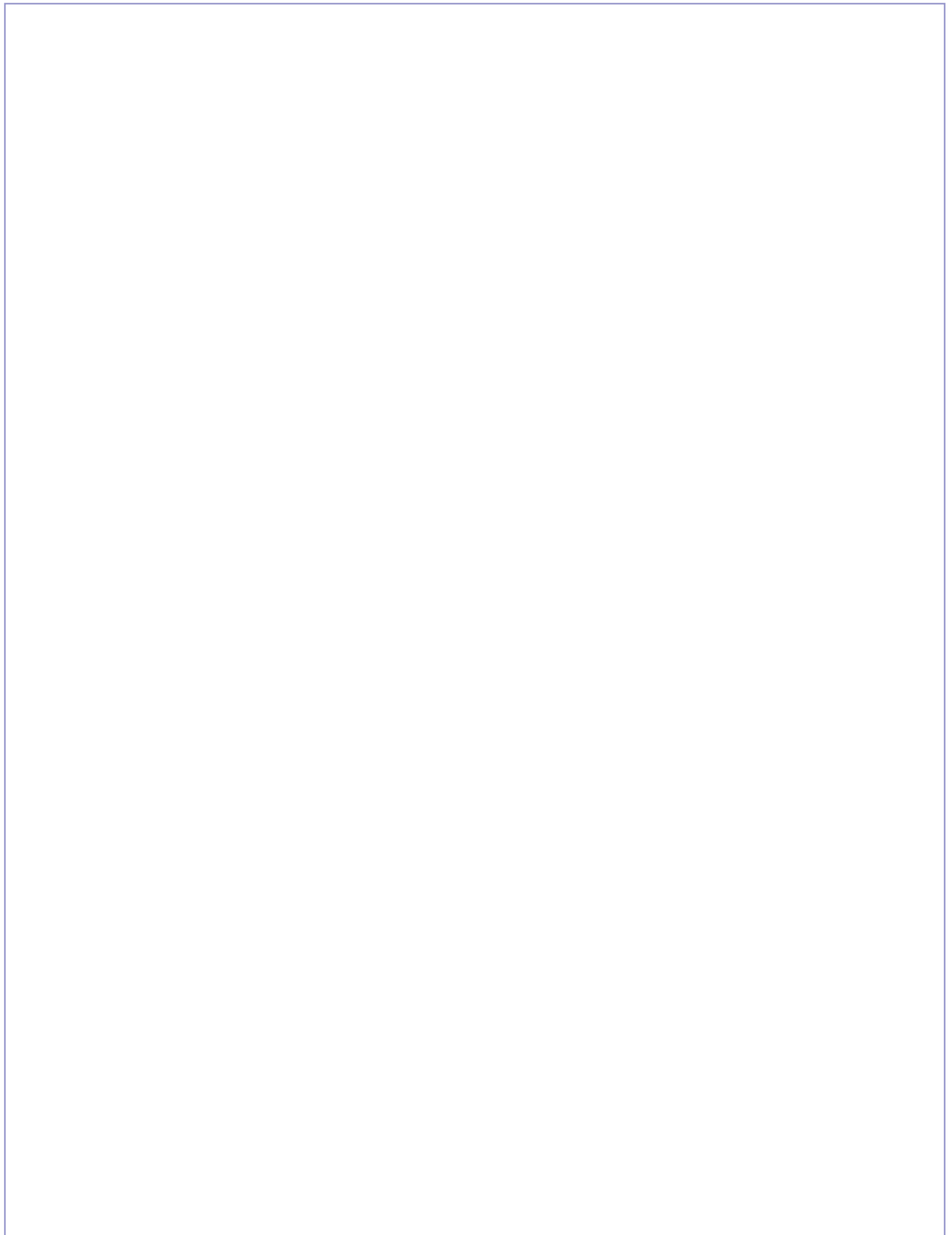
Producing a report of this type would not be possible without drawing upon the work of the entire CSU-LSAMP community, past and present, whose efforts have contributed to the substance of the report in myriad ways, including program development and implementation, data production and project evaluation, project administration, fiscal management, and (of course) funding and advocacy. In the listings of the state-wide leadership and Campus Coordinators provided on pp 32-34 and in the pull-outs below, CSU-LSAMP acknowledges the contributions of many of the individuals and groups that are currently associated with CSU-LSAMP. It is equally important to acknowledge those whose shoulders the current project stands upon. Since the number of individuals who have served CSU-LSAMP is too extensive to name them all here, we can only say that we recognize and greatly appreciate their contributions. This being said, we would be remiss if we did not expressly acknowledge the members of the team who envisioned and wrote the initial "AMP" proposal for the CSU. That team included: the late Dr. Frank Collea, then Director of Research and Sponsored Programs at the Chancellor's Office, who spearheaded the effort; Dr. Paul Fonteyn, then Dean of Graduate Studies and Interim Director of Development at San Francisco State University and currently President at Green Mountain College in Vermont; Dr. Ralph Mills, then Assistant Vice Chancellor for Research and Sponsored Projects at the Office of the Chancellor; and Dr. Philip Garcia, Director of Analytical Studies at the Office of the Chancellor, who has continued to serve CSU-LSAMP by providing system-wide data and reports and as a liaison with the Chancellor's Office. Finally, we would like to acknowledge San Francisco State University, which served as the lead institution for the first two project periods and express our great appreciation for the leadership provided by Dr. Alfonso (Rick) Ratcliffe, Dean Emeritus of Engineering at CSU Northridge, who served as Principal Investigator for Phases I and II.

#### **D A T A   S O U R C E S   F O R   T H E   C S U - L S A M P   S Y S T E M   R E P O R T**

The "CSU-LSAMP System Report" sections of this report on pp. 6-25 draw heavily from data compiled and analyzed by the Institute for Social Research (ISR) at California State University, Sacramento, the project's evaluator, and presented in annual and special reports prepared for CSU-LSAMP, under the direction of Dr. Ernest Cowles with contributions by Sandie Sutherland, Valory Logsdon, Michael Small and Michael Wright. The primary data sources accessed by ISR for these reports include: the LSAMP Annual Survey (WebAMP), maintained by ICF Macro International, which includes participant information and activity data collected annually from participating campuses; degree and enrollment reports from the CSU Office of Analytics Studies; the CSU Electronic Records System, the centralized reporting system for all CSU campuses, maintained by the CSU Office of Analytical Studies, which includes individual student-level information on matriculation, enrollment, and degrees awarded within the CSU; The National Student Clearing House, an electronic registry that includes individual student-level information on enrollment and degrees awarded nationally for subscribed colleges and universities; and the Consortium for Student Retention Data Exchange, which produces annual retention and graduation studies for STEM and non-STEM disciplines for members of the consortium.

#### **G R A N T   A N D   C O N T R A C T   A D M I N I S T R A T I O N**

University Enterprises, Inc. (UEI), an auxiliary of California State University, Sacramento, under the direction of Mr. Jim Reinhart (Executive Director) and Ms. Monica Kauppinen (Director of Contract and Research Administration) is the grantee for the CSU-LSAMP NSF award. In light of the size and complexity of the CSU-LSAMP project, which involves disbursements to and monitoring of expenditures at 22 campuses, CSU-LSAMP is especially grateful to the grant management team assigned to the project not only for their high level of fiscal expertise but also for their exceptional understanding of and commitment to the goals of the project. This team is led by Ms. Minnie Chabot, Grant Management Specialist, and includes Ms. Tina Leon, Grant Administration Specialist, and Ms. Angela Lozano, Account Administration Associate.







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IMPACT REPORT: 1993 - 2011



San Diego State LSAMP students at SACNAS 2010 proudly "spelling" out LSAMP