

Improving STEM Success and Access for Hispanic Students
Los Angeles Mission College
HSI STEM - 2011

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Improving STEM Success and Access for Hispanic Students

Magnitude of Need for Services: Los Angeles Mission College is a comprehensive, public two-year institution founded in 1975 as the ninth, and newest, college in the Los Angeles Community College District (LACCD) and the 100th community college in California. Continuing a steady growth pattern, credit enrollment reached 10,275 in Fall 2010. **Almost 90% of the student body is minority and Hispanic students make up 71% of the total enrollment.** It is expected that enrollment will remain the same or be slightly lower in Fall 2011 due to significant budget cuts across California Community Colleges. **At Mission, 28% of the students have a primary language other than English. Students reporting Spanish as their primary language constitute 20% of the current Mission enrollment.**

OVERVIEW OF MISSION STUDENTS SERVED—FALL 2010					
Gender	#	%	Age	#	%
Male	3,932	38%	Concurrent HS	684	6.67%
Female	6,343	62%	Less than 20	3,300	19.9%
Ethnicity	#	%	20 – 24	3,318	28.0%
African American	411	4%	25 – 34	1,864	18.4%
Asian	719	7%	35+	1,777	17.32%
Caucasian	1,130	11%	Credit Load	#	%
Hispanic	7,296	71%	< 6	4,028	39%
Other/No Response	719	7%	6.0 – 11.9	4,035	39%
			12+	2,212	22%
Financial Aid by Ethnicity (unduplicated count)					
African American	71		Hispanic	2028	
Asian	77		Native American	18	
Caucasian	115		Other/No Response	1530	
HISPANIC Student Profile					
Full Time	21%		Low income	72%	
Part time	79%		Underprepared English	94%	
Average age	24.4		Underprepared math	98%	
Female	64%		First-generation	53%	
Male	26%		Work (any # hrs)	56%	
Degree/transfer seeking	46%		undecided major	57%	
Sources: California Postsecondary Education Commissions and District Database and Los Angeles Mission College Office of Institutional Research and Planning					

Patterns in enrollment show students are split between day courses (65.3 %), evening courses (22.4 %) and a combination of weekend and online (12.2 %). This split is evidenced by the fact that **34% of Mission students are working at least 40 hours a week** and another 28% work between 20 and 39 hours per week. **Among Hispanic students, those working increase to 56%.** Of the 71% Hispanic student population, **79% attend part-time and 72% are low-income.**¹

Faculty of Mission College: In Fall 2010, Mission employed 73 full-time and 455 adjunct faculty members. **Among full-time faculty, 35% are minorities compared to 90% of its students.** Mission is dedicated to diversifying its staff and faculty and is committed to issues of diversity and equity. While the diversity of the faculty and staff does not currently reflect that of our service area, diversity is sought (to the extent the law allows) in new hires.²

Need for the Project

Community and Service Area: Mission has strong historical ties to the economically and ethnically diverse communities in the Northeast San Fernando Valley, while in recent years the enrollment base has expanded to include many of the communities throughout the greater San Fernando Valley, Canyon Country and Santa Clarita. Mission’s primary service area still remains in the three neighborhoods—Sylmar, San Fernando, and Pacoima—where **economic hardship is tied to low education level.**

Mission’s Primary Service Area: Sylmar, San Fernando and Pacoima				
	Service Area	L.A. County	CA	U.S.
Hispanic Population	85%	48%	36%	15%
Economic Hardship per capita income	\$17,254	\$27,655	\$29,388	\$27,589
Education Level high school completion	55%	75%	80%	85%

¹ Los Angeles Mission College Office of Institutional Research and Planning

² Los Angeles Mission College Accreditation Report Standard III. A: Human Resources http://lamission.edu/accreditation/FINAL%20STANDARDS/Final_Standard_III-A.pdf

Bachelor's Degree	12.7%	28%	30%	28%
<i>Los Angeles Mission College Office of Institutional Research and Planning</i>				

Well over three-fourths (85%) of Mission’s primary service area residents are Hispanic, and although the median household income (\$53,178) is comparable to the County and State, per capita income (\$17,254) of residents in Mission’s service area reflects a wide disparity and true economic challenge. The challenge is further accented with low educational attainment, only 55% of the residents have high school education and barely over 10% hold Bachelor’s degrees.

The *2010 Science and Engineering Indicators* from the National Science Board emphasize that while the capability to work in science and technology increased throughout the world, the number of the U.S. workforce qualified in these fields continues to decline. The downward trend is compounded by the fact that the proportion of Hispanics and other minorities in STEM occupations remain grossly underrepresented: Minorities constitute 24% of the total U.S. population but only 10% have a STEM related degree and barely 4% of Hispanics are in those occupations.³ In 2010, less than 1% (.21%) of Los Angeles Mission College (Mission) students attained STEM related degrees and only seven (7) of over 10,000 students, transferred with a STEM major.⁴

The need to increase Hispanic graduates is further recognized in the American Graduation Initiative, President Obama’s historic initiative to strengthen our nation’s community colleges which calls for five million additional graduates by 2020.⁵ A study presented at the 2011 Institutional Services Project Directors’ Conference projected that Mission needs to award 1,196

³ National Science Board, *Science and Engineering Indicators: 2010*, <http://www.nsf.gov/statistics/seind10/c2/c2h.htm>

⁴ Los Angeles Mission College Office of Institutional Research and Planning

⁵ *Winning the Future: President Obama’s Agenda and the Hispanic Community*, March 2011, http://www.whitehouse.gov/sites/default/files/rss_viewer/winning_the_future_hispanic_community.pdf

additional degrees and specifically 913 degrees to Hispanic students by 2020 in order to meet the objectives in President Obama's plan.

Los Angeles Mission College must prepare for continual expansion and the needs of a culturally diverse and academically challenged student body. The College also must improve transfer career pathways in STEM to increase access and better prepare its Hispanic student population to compete in the global market. The HSI STEM project at Mission will 1) create a comprehensive **STEM Center** that combines academic and student support services; and 2) build capacity to **increase articulation agreements for STEM** majors between Mission and four-year universities.

Gaps/Weaknesses in Services, Infrastructure Addressed by Project and Address the Needs of Students at Risk of Educational Failure

Gap 1 - Few STEM Majors and Low STEM Transfer Number: Exposure and education in STEM are critical in meeting the workforce demands in the national and international realms. Degree attainment and transferring to a four-year institution represent the first steps in the STEM career pathway: an overwhelming 53% of those in the science and engineering field working on research and development indicate having a bachelor's degree.⁶ The majority of Mission's students, however, struggle with the overall college-going experience. Of the 71% Hispanic students, 53% are first-generation and 72% indicate low-income, 56% work and 79% attend class part-time. Exposure to the benefits of higher education is further minimized at home where only 12% of the residents in Mission's primary service area hold a bachelor's degree.

Recent fiscal crisis coupled with lack of resources for STEM services further challenge Mission. Los Angeles Community College District officially announced a 5% budget reduction plan effective June 2011 and a possible 15% reduction contingency plan later this year. The plan

⁶ National Science Board, Science and Engineering Indicators: 2010

translates to tuition and fee increases, limited or no summer session, and drastic cuts in course sections, professional development and critical student services.⁷ Mission is paralyzed in its ability to add innovative curriculum or update technology needed to increase the viability of our STEM programs.

Although the numbers of students majoring in Biology and Math have been slowly increasing since Fall 2008, the total number of students declaring STEM majors remains unacceptably low.

L.A. Mission College Unduplicated Declared STEM Majors 2007 to 2010⁸							
	Fa 07	Sp 08	Fa 08	Sp 09	Fa 09	Sp 10	Fa 10
Physical Sciences	5	11	10	5	10	22	16
Chemistry	0	0	0	0	0	0	0
Biology	71	69	81	96	110	143	164
Math	23	26	25	27	35	41	47
Computer Science	52	31	17	8	5	5	3
<i>Los Angeles Mission College Office of Institutional Research and Planning</i>							

Degree attainment in STEM fields, especially among Hispanic students reflects the number of STEM majors and shows an even

more dismal picture. The **transfer rate of students from Mission to University of California (UC) and California State University**

L.A. Mission College Hispanic Degree Awards 2007-2010			
	2007-08	2008-09	2009- 10
Total Degrees (AA/AS)	304	284	227
STEM Degrees Awarded	9	16	21
<i>Los Angeles Mission College Office of Institutional Research and Planning</i>			

(CSU) systems is the lowest of the Los Angeles Community College District. The year 2009-

10 showed the lowest number in the last five years with only 194 students transferring.⁹ On average, 24 students transfer to the UC system and 224 to the CSU system each year. The actual

⁷ Los Angeles Community College District, Chancellor’s Budget Update, April 18, 2011

⁸ The numbers of students could be duplicated between the semesters as they continued their education; but it will not be duplicated between majors in one semester.

⁹ California Postsecondary Education Commission, Transfer Pathway 2010, <http://www.cpec.ca.gov/OnLineData/TransferPathwayChart.asp?Inst=195953>

number of transfers is disheartening considering that the number of enrollments is above 10,000 and close to 40% of those students indicate transfer as their educational goal.¹⁰ Even more alarming is the number of students transferring with a declared STEM major. In 2010, only **230 students (2% of the total student population)** majored in one of six STEM disciplines offered at Mission with the highest concentration in biological science and Computer Science.

Transfer data from the University of California-California Community Colleges Transfer Success Data Sharing Program further revealed that **of the 86 Mission students applying at one of the UC campuses for Fall 2011, only seven were declared STEM transfer students.**

Additionally, the number of Associate of Science degrees awarded to Hispanic students in 2009-10 was merely 21. Of the 7,296 Hispanic students at Mission, over half are first generation meaning little to no exposure to the college-going experience or the benefits and career opportunities associated with a STEM degree. On average, the total incoming students declaring a STEM major are less than 2%.

Gap Addressed by: Establish a STEM Center which will include a new Computer Science Lab; Curriculum development in Math, Biology, Computer Science, and Physical Science to increase technology across STEM discipline; Hire a dedicated STEM Transfer and Articulation Specialist who will advise on STEM majors and career pathways; Expand STEM tutoring and supplemental instruction; and Develop Summer STEM Academy that would serve as an academic bridge for incoming students and introduce STEM learning at Mission.

Gap 2 - Incoming Students are Underprepared to Succeed in Science Gateway Courses: An understanding of science is necessary for our students to succeed in the 21st century workforce. Less than 65% of Mission students are able to successfully pass core science courses. Dire is the

¹⁰ Los Angeles Mission College Office of Research and Planning

fact that half of the science courses offered at Mission indicate declining success and retention rates. Considering that these courses are prerequisites in STEM degree programs and essential in transferring to four-year universities, additional academic support must be implemented to reverse the downward trend.

Subject	STEM Success Rate ¹¹			STEM Retention Rate ¹²		
	Fall-2008	Fall-2009	Fall-2010	Fall-2008	Fall-2009	Fall-2010
Anatomy	52.9%	60.7%	57.8%	75.0%	80.9%	71.1%
Anthropology	51.6%	54.0%	59.3%	81.1%	83.8%	84.1%
Biology	57.3%	65.0%	66.6%	82.7%	86.4%	88.4%
Chemistry	76.9%	69.4%	62.9%	87.6%	86.6%	80.0%
Computer Science	56.9%	60.5%	63.0%	87.9%	87.8%	81.8%
Engineering Gen	67.9%	66.7%	62.9%	78.6%	100.0%	94.3%
Geography	74.0%	68.7%	64.8%	94.3%	89.6%	89.3%
Geology	81.8%	96.3%	90.0%	90.9%	100.0%	92.5%
Health	65.9%	62.4%	68.5%	89.3%	91.9%	94.0%
Math	48.2%	51.7%	48.6%	71.7%	77.3%	76.2%
Micro Biology	66.7%	74.5%	57.4%	79.8%	85.3%	73.1%
Oceanography	89.7%	56.5%	54.0%	92.3%	87.1%	64.4%
Physical Science	81.3%	77.1%	77.6%	93.8%	88.1%	87.8%
Physics	45.0%	50.0%	75.0%	55.0%	67.9%	85.7%
Physiology	69.0%	76.7%	78.9%	79.3%	94.8%	86.2%

Source: Los Angeles Mission Institutional Research and Planning

Low Placement in Math Prolongs the Transfer Pathway: More than 90% of the incoming Hispanic freshmen place in Developmental Math. Success in the first year of Math could have a major impact on students' choice in the STEM field. In 2008, the Math Department developed a new, software-based track system for Elementary and Intermediate Algebra. The average success rate greatly improved from 50% to 65% with 85% retention rate for the new model.¹³ Data strongly indicates that developing and piloting innovative curriculum greatly benefits student

¹¹ *Success Rate* - The percentage of students who received a passing grade of A, B, C, P at the end of the semester. Success rate = (A,B,C,P)/(A,B,C,D,F,P,N,W,I)

¹² *Retention Rate* - The percentage of students retained in a class at the end of the semester. Retention rate = (A,B,C,D,F,N,P,I)/(A,B,C,D,F,P,N,I,W)

¹³ Los Angeles Mission College Math Department

learning especially for those majoring in STEM. The planning, implementing, evaluating, and most importantly supplementing stages of new curriculum must be strategic.

In addition to assessment testing results, enrollment data shows that Mission enrolls far more students in pre-college math than college-level transferable math. In fact, it appears that the ratio of developmental (under-prepared) math students to college math students continues to rise (see chart below). In the past several years, Mission has consistently worked to improve student success and passing rates in all math courses, however, the overwhelming number of students in developmental coursework have proven that additional strategies are needed. Students simply progress too slowly through the required math sequence: only about 5% percent of students who placed into Pre-Algebra successfully complete the college-level math within three years.

Progression of STEM Cohort in Math Successfully Completing College Level Course within Three Years[1]									
	Fall 2006 - Fall 2008			Fall 2007 - Fall 2009			Fall 2008 - Fall 2010		
Courses	Initial Enrolled	Completed	Progress %	Initial Enrolled	Completed	Progress %	Initial Enrolled	Completed	Progress %
Pre-Algebra	661	386	58.4%	647	397	61.36%	814	472	57.99%
Elementary Algebra	245	129	19.52%	277	155	23.96%	311	188	23.1%
Int. Algebra	85	52	7.87%	105	53	8.19%	135	80	9.83%
College Level	35	23	3.48%	47	37	5.72%	70	49	6.02%
Progression Rate ¹⁴	23/661=3.48%			37/647=5.72%			49/814=6.02%		
<i>Los Angeles Mission College Institutional Research and Planning</i>									

Moreover, in studying the progression rate of the combined three-year math cohort, Mission found that although the completion rate for each math course is relatively high, the

¹⁴ Successful Progression is defined as the number of students who completed college level divided by the number of students who Enrolled Initially in Pre-Algebra.

progression rate from lower to higher level math falls dramatically; the majority of students who exit the developmental math sequence do not move forward to take the college level courses.

There is a high need for more instructional assistance as well as targeted academic guidance.

Additional approaches in promoting persistence are key in solving student success.

STEM Cohort Progression Rate - Combined Three-Year Cohort				
	Enrollment	Completed	% Completion	%Progression
Pre-Algebra	2122	1255	59.1%	n/a
Elementary Algebra	833	472	56.7%	22.2%
Intermediate Algebra	325	185	56.9%	8.7%
College Level	152	109	71.7%	5.1%
<i>Source: Los Angeles Mission Institutional Research and Planning</i>				

At a time when Mission struggles to provide adequate resources for under-prepared students, additional pressure for improving developmental math at Mission is caused by the fact that the four year institutions are: 1) not accepting the developmental courses for transfer credit, 2) no longer offering their own development math courses, and 3) referring students with math deficiencies to the community colleges. The starting point for these students is even more crucial with the recent mandate from the State Academic Senate requiring Intermediate Algebra rather than Elementary Algebra in order to graduate with an Associates degree. Moreover, effective Fall 2012, a new admission rule will require that all California State University (CSU) incoming students begin any necessary remediation during the summer before their matriculation leaving the community colleges as their most affordable and accessible option.¹⁵

Part-time Students Need Additional Support to Increase Academic Success: Their lower success rates will make it even more difficult for them to realize their educational goals.

¹⁵ California State University Executive Order-1048

With close to 70% of Mission students having part-time status (79% for Hispanic students), low success rates are inevitable.

Comparison of Success Rates in Science Classes Full and Part-Time Students 2008-2010¹⁶
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<i>Based on the three year average differential for academic years 2008, 2009, and 2010, part-time students enrolled in science classes were approximately 10% less likely to pass the course, than their fulltime counterparts in the same time period.</i>

Gap Addressed by: Curriculum revision and development to include technology across STEM; Tutoring and supplemental instruction in STEM courses; Online and video tutorials for part-time students; Summer STEM Academy where math preparation will take center stage; and Establish high school and community outreach team as well as ongoing STEM activities and events to increase awareness in STEM.

Gap 3--Low Level in English/Reading and Writing Hinder STEM Coursework and

Transfer Success: Students entering Mission are underprepared in the language arts resulting in low success in STEM coursework that require writing lab reports and papers. According to the Assessment and Placement Management System (APMS) from 2007 to 2009, only 14.2% of incoming students were placed in college-level English. For reading, the percentage is lower at 11%. College-level English course (English 101) is now a requirement for transfer at UC and CSU, a change in policy since Fall 2008.¹⁷ Academic support in English is critical in raising the transfer rate of STEM majors. The need is especially high for Hispanic students; 94% placed in the Developmental Communications level in Fall 2010.

¹⁶ Los Angeles Mission College Office of Institutional Research and Planning

¹⁷ University of California Transfer Admissions Requirements, <http://www.universityofcalifornia.edu/admissions/transfer/requirements/index.html> and California State University Plan for College, <http://www.csumentor.edu/planning>

Comparison of Pass Rates: Developmental Communications 1 to English 101 Fall 2007-2010									
	2007 - 2008			2008 - 2009			2009 - 2010		
English Courses	Enrolled / Passed		%	Enrolled / Passed		%	Enrolled / Passed		%
Dev. Comm. 1 Grammar	1488	681	46%	780	368	47%	597	283	47%
Dev. Comm. 34 Basic Reading	226	101	45%	154	68	44%	179	89	50%
Dev. Comm. 36A Reading Comp.	1752	989	56%	990	596	60%	764	417	55%
English 21 Eng. Fundamentals	1996	1041	52%	1052	572	44%	858	512	54%
English 28 Int. Reading	2199	1428	66%	1389	980	71%	1102	784	71%
English 101 College Level Eng.	2240	1419	63%	1369	955	70%	1351	956	71%
<i>Source: Los Angeles Mission Institutional Research and Planning</i>									

As stated above, less than 15% of Mission’s students initially assess at English 101 and nearly one-third of enrolled students do not successfully complete this class. Students progress very slowly through the English sequence of courses; only about one in four English 21 students progress to complete English 101 within two years (see chart below).

Progression of STEM Two-Year Cohort: Successful Completion of English 21 to 101						
	Fall 2006 to Fall 2008		Fall 2007 to 2009		Fall 2008 to Fall 2010	
	Initial Enrolled	Completed	Initial Enrolled	Completed	Initial Enrolled	Completed
English 21	397	277	466	304	551	342
English 28	230	180	256	201	265	198
English 101	119	98	146	126	136	105
Progression Rate	24.7%		27.0%		19.1%	
<i>Source: Los Angeles Mission Institutional Research and Planning</i>						

Gap Addressed by: Summer STEM Academy where a core science course will be paired with a writing course.

Gap 4—Laboratories Are Outdated and Not to University or Industry Standards: Students

come to college expecting to learn, be able to use equipment that is comparable with what is being used at the four-year colleges/universities and in the work-force. Given the major budgets cuts, equipment cannot be upgraded or replaced to meet current needs. This places our students at an extreme disadvantage in that they are: 1) not prepared for transfer or careers and 2) short-changed in their education. Although Mission is in the process of constructing a new Science Building to be open 2013, the funding for a Computer Science Lab, equipment and supplies are not included in the plan. Of all the labs in being included in the new building, the Computer Science Lab with no line item in the College’s budget for any type of improvement.

The current Computer Science (CS) lab at Mission is inadequate and poorly designed with equipment that is seriously outdated and does not support the applications and software required to effectively enhance other STEM disciplines. The space is simply not big enough for the number of students that are now enrolling in CS. These labs were designed 16 years ago when instructional classes were serving at maximum 25 students per class—current class enrollment on average is 33 students for all classes.

Computer Science Enrollment by Ethnicity					
	2007-08	2008-09	2009-10	Total	%
Asian	49	41	73	163	8.3%
Black, African-American	28	47	41	116	5.9%
Caucasian/White	70	97	102	269	13.7%
Hispanic/Latino	363	422	462	1247	63.6%
Other	9	13	12	34	1.7%
Unknown	37	45	49	131	6.7%
	556	665	739	1960	
<i>Los Angeles Mission College Institutional Research and Planning</i>					

High enrollment in Computer Science courses is offset by low degree attainment: only eleven Associate’s degrees, five to Hispanic students, were awarded from 2007 to 2010. **In 2007 there were 57 students majoring in CS, as of Fall 2010, that number has dropped to three.**

Newer classes including Networking, Computer Technical Services and Computer Design require space for the students to work with equipment. The design of the lab prohibits efficient methods of observation and assistance by staff/instructors. Insufficient lab space has forced the department to delay offering key certificate related courses including Computing Technology Industry Association A+ Certification, Computing Technology Industry Association Network Certification, and Microsoft IT Academy. The lack of current technology has prevented the department from developing new programs and courses. Even with these gaps and deficiencies, **data shows that Computer Science has a retention rate of 87% and a completion rate of 56.4%**. The completion rate needs to be brought up to the college average of 75%.

Gap Addressed by: Renovation of the STEM Computer Science Lab equipped and designed to industry and university standards.

Gap 5--Lack of Lab Experience Critical in STEM: Students majoring in Biology are required to take 18 units (six courses) in biology to transfer and pursue a B.S. degree in the life sciences.

Although Mission presently offers the minimum life science units to transfer, the competitive environment at the transferring schools demand more advanced courses and solid laboratory experience prior to the transfer.

"I've been working with LA Mission College student researchers during the summers for at least 10 years, and I always look forward to it! They're better than our 'home grown' CSUN students, and often an inspiration to others in my lab. Your students are motivated, well-trained, disciplined, and interested in gaining research experience before they transfer to CSU or UC campuses. The fact that you meet with them regularly during the summer to encourage and support their development is a critical reason for their success."

Stan Metzenberg, Ph.D.

CSUN Professor

Over the past 13 years, Mission has intermittently arranged summer research internships for our students through local universities and biotechnology companies. **Of the 95 Hispanic students who participated, over 70% have gone on to earn a B.S. in a natural science and more than**

30% have earned a graduate (MS and/or PhD) or professional (MD, DPT, PharmD, or DDS) degree.¹⁸ Hands-on lab experience proves to be a determinant in degree attainment and career choice in STEM.

A primary factor in generating the required level of motivation and commitment of a student to pursue a bachelors and graduate degree in the sciences is experience in a research laboratory early in the educational pathway. The ability to interact one-on-one with faculty, scientists and graduate students opens the door to an academic realm that is truly representative of what they will encounter in the future. Students benefit from the experiences of those who preceded them and will be better prepared to handle challenges that may occur. Students who are able to spend time working in a research laboratory become accustomed to the real culture and practice of science, a familiarity which most students never experience.

Gap Addressed by: Expand undergraduate research program and formalize the relationship with four-year universities and private labs.

Gap 6--Inadequate STEM Transfer Assistance and Articulation Agreements between

Mission and Four-Year Institutions: The current **ratio of academic counselors to students is 1:1,428**. There are only seven full-time academic counselors providing guidance on general transfer requirements for all disciplines. Through the current Cooperative Title V Program with Loyola Marymount University, Mission has an academic advisor specifically for teacher preparation students. Students with STEM majors also need an academic counselor who can focus on their unique needs. Increasing awareness and knowledge in the transferring process is especially needed for Hispanic students.

¹⁸ Los Angeles Mission College, Department of Life Sciences

Transfer assistance and articulation agreements require constant updates, review and revision which Mission staff does not have the capacity to provide. The success of STEM transfer depends in a large part on articulation agreements between Mission and four-year institutions, however, these agreements vary widely and tend to be difficult because of historical differences in practices, policies and curricula. Too often, after completing an Associate of Arts/Associate of Science (AA/AS) at Mission a student is not accepted to the four-year institution of their choice. They have to take up to a year's worth of additional and/or similar classes still hoping to be accepted to their second or even third choice of four-year institution. As a general rule, most of the students who are put in this position choose to end their education with their AA/AS.

Only a half-time articulation officer is available to handle the complex system and requirements. The lack of time and staffing critically limit articulation efforts needed to grow the STEM articulation agreements and help those students interested in STEM majors navigate through the transfer process.

Overcoming the discrepancies in articulation resulting in the inability for Mission's students to transfer seamlessly into the local four-year institutions must start somewhere. As can be seen on the following chart, there is no "seamless" way to transfer from Mission to the University of California (UC) or California State University (CSU) systems. Mission proposes to set an articulation model that can be replicated across the LACCD and throughout California.

Transfer Major Requirements for Sciences				
CSU Los Angeles	CSU Northridge	UC Los Angeles	USC	Loyola Marymount University
Eng 102 - 3 Bio 6 - 5 Bio 7 - 5 Chem 101 - 5 Chem 102 - 5 Co. Sci 440 - 3 Geog 1 - 3 Geog 2 - 3 Math 227 - 4 Math 265 - 5 Math 266 - 5 Math 267 - 5 Math 270 - 3 Math 275 - 3 Philos 9 - 3 Physics 6 - 4 Physics 7 - 4	Eng 101 - 3 Bio 6 - 5 Bio 7 - 5 Chem 101 - 5 Chem 102 - 5 Co. Sci 407 - 3 Co. Sci 417 - 3 Co. Sci 440 - 3 Co. Sci 436 - 3 Geog 1 - 3 Geog 2 Geol 1 - 3 Math 227 - 4 Math 260 - 5 Math 265 - 5 Math 266 - 5 Math 267 - 5 Math 270 - 3 Math 275 - 3 Physics 6 - 4 Physics 7 - 4	Eng 101 - 3 Eng 102 - 3 Bio 6 - 5 Bio 7 - 5 Bio 40 - 3 Chem 101 - 5 Chem 102 - 5 Co. Sci 439 - 3 Co. Sci 440 - 3 Geog 1 - 3 & Geog 15 - 2 Geog 2 - 3 Math 227 - 4 Math 265 - 5 Math 266 - 5 Math 267 - 5 Math 270 - 3 Math 275 - 3	Low Div Writ - 3 units Eng 102, 103 or Philo 5 Bio 6 - 5 Bio 7 - 5 Chem 101 - 5 Chem 102 - 5 Math 265 - 5 Math 266 - 5 Math 267 - 5 Math 270 - 3 Math 275 - 3 Physics 6 - 4 Physics 7 - 4	University Core Requirements Eng 101 - 3 Eng 102 - 3 History 1/2 - 3 Philos 5 or Speech 101 - 3 Philos 33 Soc Sci - 6 units Bio 6 - 5 Bio 7 - 5 Chem 101 - 5 Chem 102 - 5 Co. Sci 436 - 3 Co. Sci 452 - 3 Math 265 - 5 Math 266 - 5 Math 267 - 5 Math 270 - 3 Math 275 - 3 Physics 6 - 4 Physics 7 - 4

Gap Addressed by: Hiring a dedicated STEM Articulation and Transfer Specialist to increase the number of STEM articulation between Mission and four-year colleges and universities

Project Design

This project is designed not only to meet the purpose of the HSI-STEM legislation but to expand and enhance educational opportunities for, and improve the academic attainment of Hispanic students. By fulfilling the goals and objectives described below, this project will attain the absolute priorities of the HSI- STEM legislation: (1) to increase the number of Hispanic and other low income students attaining degrees in the fields of science, technology, engineering, or mathematics; and (2) to develop model transfer and articulation agreements between

two-year Hispanic-serving institutions and four-year institutions in such fields. Additionally, the evaluation component of this project has been designed to emphasize data-based decision making in accordance to the HSI- STEM competitive preference priority and will collect, analyze, and

“...the technology in teaching and learning doesn’t necessarily means a lot of advanced gadgetry [although one can take advantage of it], but it means basically thinking systematically about what it takes to motivate and engage students using the principle of ‘need-to-know’...invest in education, invest in innovation, invest in infrastructure...”

Dr. Eduardo Ochoa,
Assistant Secretary for Postsecondary Education at
U. S. Department of Education

use high-quality and timely data, including data on program participant outcomes in the following priority area: Improving postsecondary student outcomes relating to enrollment, persistence, and completion and leading to career success.

Finally, this project was designed to address strategic initiatives, vision and mission statements and goals of the partnering institutions, as represented in the table below:

Goals, Measurable Objectives and Outcomes

HSI STEM Goal/Priority	Objectives					
1. Increase the number of Hispanic and other low-income students attaining degrees in STEM fields.	1.0 By September 2016, the number of Hispanic and other low-income students attaining degrees in STEM fields will increase from a 2009-10 baseline of 21 to 42 (an increase of 100%).					
	baseline	2011-12	2012-13	2013-14	2014-15	2015-16
	21	24	27	32	37	42
2. Increase the number of Hispanic students transferring to a four-year college or university in STEM fields.	2. By September 2016, Hispanic students transferring with a STEM degree or transfer certificate from Mission to four-year institutions will increase 200% from 2009-2010 academic year baseline of 7.					
	baseline	2011-12	2012-13	2013-14	2014-15	2015-16
	7	8	11	14	17	21
To increase the progression rate of college-level math.	3. By September 2016, the progression rate of college-level math enrollment relative to remedial math will increase from 2009-10 baseline of 6% to 15%.					
	baseline	2011-12	2012-13	2013-14	2014-15	2015-16
	6%	7%	8%	10%	12%	15%

		increase	increase	increase	increase	increase
To increase the number of articulated STEM courses between Mission and local four year institutions.	By Fall 2016 100% of revised STEM courses will have with approved articulation agreements between Mission and four-year institutions over a base of zero(0) .					
	baseline	2011-12	2012-13	2013-14	2014-15	2015-16
	Annual measures are dependent on the number of courses revised annually. There will be a 1:1 ratio of revision and articulation					
To increase the number of Hispanic students registering for and completing courses in science, technology, engineering and math.	By Fall 2016, 25% of the Hispanic students taking part in Summer Bridge, Math Prep or Summer Academy will register for a minimum of one STEM course within two Semesters of their participation.					
	baseline	2011-12	2012-13	2013-14	2014-15	2015-16
	0	3% students	11% students	16% students	21% students	25% students
To increase the success rates of Hispanic Students in dev. and transfer level math	Students taking part in math tutoring and SI at the STEM Center will succeed in college level math in rates 15% higher than those who do not use the tutoring/SI services.					
	Annual measures will match students in the same course who take part in tutoring and SI and those who do not.					
To increase the number of Hispanic students persisting to graduation in a STEM field.	By 2016, students taking part in research internships will persist to graduation with a degree in a STEM field or Transfer Certificate at a rate 20 times greater than those not participating in research internships.					
	Annual measures will match students in the same course who take part in tutoring and SI and those who do not.					
Outcomes						
<ul style="list-style-type: none"> • Significant increase in STEM course enrollment at Mission, yielding additional STEM graduates. • Early identification and accelerated remediation for Hispanic students who demonstrate aptitude for STEM coursework but lack prerequisite courses with basic math skills. 						

- Expanded use and integration of technology in STEM courses, increasing student and faculty knowledge in updated technology.
- Establishment of Mission STEM Center with a state-of-the art Computer Science Lab.
- Increase in Hispanic student engagement and retention through a) STEM Summer Academy, b) Math Preparation Boot camp and Workshops, and c) Undergraduate Research Internship.
- By September 2016, 21 Computer Science courses will be updated and Student Learning Objectives modified.
- At least 35% of students enrolled in STEM courses (average of 1,500 students per year) will be tutored with newly-developed academic programs. At least 80% of those tutored will express satisfaction with tutoring.
- By September 2016, at least 80% of faculty teaching STEM courses will be trained in the use new technology in the classroom.
- At least 80% of students participating in STEM Summer Academy and Undergraduate Research Internship will express satisfaction with newly-developed program.
- By September 2016, develop and approve articulation agreements for 25% of revised courses in STEM compared to 2009-10 baseline of 216.
- At least 80% of students participating in STEM Transfer and Career activities express satisfaction with newly-developed program.

Design Addresses Needs of Target Population: The 2010 report from the National Science

Board identifies three action plans to prepare the next generation of STEM workforce:

- I. ***Providing opportunities for excellence*** where students learn at a pace, depth, and breadth commensurate with their talents and interests and in a fashion that elicits engagement, intellectual curiosity, and creative problem solving—essential skills for future innovation.
- II. ***Cast a wide net*** to identify *all* types of talents and to nurture potential in *all* demographics of students, particularly among those individuals who have not been given adequate opportunities to transform their potential into academic achievement.
- III. ***Foster a supportive ecosystem*** that nurtures and celebrates excellence and innovative thinking. Parents/guardians, education professionals, peers, and students themselves must work together to create a culture that expects excellence, encourages creativity, and

rewards the successes of all students regardless of their race/ethnicity, gender, socioeconomic status, or geographical locale.¹⁹

The HSI-STEM project at Los Angeles Mission College directly responds to the above recommendations by creating a comprehensive STEM Center that combines academic and student support services while building capacity to increase articulation agreements between Mission and four-year universities. The new STEM Center with a modern Computer Science Lab will allow for updated coursework, supplemental instruction, lab experience, and academic bridge that would support innovative STEM education at Mission. The project will support a new teaching space designed with the latest technologies and expert input to foster innovative teaching approaches both in and out of the classroom. The newly developed academic programs specifically targeting Hispanic and low-income students will address students' learning needs and promote the environment necessary to achieve academic success.

¹⁹ *Preparing the Next Generation of STEM Innovators: Identifying and Developing our Nation's Human Capital*, May 5, 2010, National Science Board.
http://www.nsf.gov/nsb/publications/2010/nsb1033_exec_summary.pdf

Project Services

Los Angeles Mission College will establish a comprehensive STEM Center combining academic and student support services. The Center will serve as the hub for STEM faculty and students, strengthening academic services by: 1) expanding tutoring for STEM students, math workshops and summer bridge programs, and supplemental instruction; 2) supporting curriculum development in math, life science, physical science and computer science; 3) renovating the computer science lab and upgrading technology; 4) offering STEM Summer Academy and bridge programs to incoming STEM majors; and, 5) expanding and formalizing undergraduate research program. The STEM Center will also build capacity in student support services for potential and current STEM students. These services will include: 1) incorporating STEM-specific outreach strategies in the feeder schools and community; and, 2) developing STEM transfer awareness and articulation through hiring a STEM Transfer and Articulation Specialist.

Los Angeles Mission College STEM Center: A good science curriculum must be supported by a well-equipped lab with adequate lab space and staffed with well-trained tutors. Building a reputation and providing students with academic support take years. Without an intellectual and academic supportive environment, even the college-prepared students will turn away from the STEM fields quickly. The new Center will see the benefit of blending all academic programming in one place as “the linkages between the STEM areas are dynamic, **highly interconnected**, and constantly evolving over time.”²⁰ Mission will adopt successful STEM Center models from Citrus and Taft Colleges.

The May 2013 expected completion of the new Science/Math building located in East of Campus is the impetus needed to begin unlimited growth of STEM programs and excellence at

²⁰ *Why STEM Topics are Interrelated*, Thornburg, David, Thornburg Center for Space Exploration 2008. <http://www.tcse-k12.org/pages/stem.pdf>

Mission. Existing tutorial services are currently provided in the West Campus with a walking time from East to West Campus at least 15 minutes. Since all science classes and most of the math classes will be offered in the new Science/Math building, the Math/STEM Center will be the nucleus for STEM instructional and student support services in the East Campus.

In addition to tutoring, supplemental instruction (SI) and academic and student support services, the STEM Center will present a series of panel discussions, with the panels composed of transfer students from surrounding four-year universities in their Junior/Senior year, who will be invited to speak about topics such as: their transfer experience, acclimation, rigor of educational program, resources (research opportunities, scholarships, etc). There will be an annual total of four student panel activities – one for each STEM category.

Expanded Math Tutoring and Supplemental Instruction: Currently there are two tracks available for completing Elementary and Intermediate Algebra. Data from the Math Department show that the average passing rate for Track1—traditional teaching of one semester of Elementary Algebra and one semester of Intermediate Algebra— is between 41-49%. Track 2 is a slower-paced, three-semester sequence which includes two-hour lab sessions with an average success rate of 65%. Aside from the significant difference in the success and retention rates for Track 2, it is important to note that the pace of the curriculum directly attribute to the results, culminating in a success and retention rate of 84% and 96% in the third semester of the sequence. To expand on the

success of the Math Department, the STEM Center will provide tutorial services, remediation

Elementary and Intermediate Algebra Tracks 2008-2010				
	Success		Retention	
	Range	Mean	Range	Mean
Track1	41-49%	45%	69-73%	70%
Track2 Semester 1	41-79	60	73-90	83
Track2 Semester 2	56-91	60	78-92	85
Track2 Semester 3	75-93	84	94-95	96

Source: Mission Math Department 2011

modular courses as well as Mathematics Diagnostic Testing Project (MDTP) workshops. The use of courseware—MATLAB, SPSS, and Mathematica—will also be expanded to include Math 215 (Principles of Mathematics) and higher to increase the rate of course progression.

This component will also improve the delivery method of academic services to reach a wider audience students targeting part-time and evening students. Online academic support services provide a number of advantages: easy access for students regardless of where they live, after-hours availability and sustainable services in terms of funding and staffing resources.²¹

Math Boot Camp and Workshops: The majority of incoming students take the Mathematics Diagnostic Testing Project (MDTP) Placement Test without any preparation. This is one reason more than 70% of the incoming students, 98% being Hispanic, are being placed in developmental math courses prolonging their college work for an additional year or more. After studying the data related to the MDTP, faculty in the Math Department discovered that many students are only one or two points away from being placed into a higher math course. This discovery led to a Summer 2010 pilot pre-placement math workshop. Of the students who attended this two-week Summer Math Boot Camp, 65% placed in or above Elementary Algebra. Many simply need a refresher workshop on a few concepts. Math Boot Camp will be formalized and incorporated into the Summer Academy for incoming freshmen.

STEM Summer Academy: A team from Mission, consisting of at least one faculty member, STEM Outreach Coordinator and Transfer Specialist, and student leaders will visit local high schools to publicize the STEM Summer Academy by the beginning of the Spring semester. This component will offer an academic bridge from high school to the community college and then from the community college to a four-year institution.

²¹ Thompson and Hills; *Online learning support services for distance education students: Responding to and maintaining the momentum*, 2005

Students taking part in the Academy will take a short-term Personal Development 40: College Success Seminar, a three-unit transferrable course specifically created for STEM majors. In addition, a science or math course will be paired with a writing course in an intense five to eight week program designed to help transition students from our local high schools into successful college students in STEM fields. Rather than focusing only on assessment and developmental coursework, the bridging program at Mission will have a strong STEM focus.

Curriculum Development: The National Center for Academic Transformation (NCAT) developed a three-phase course redesign methodology about 10 years ago with constant refinement.²² Six states use the NCAT course redesign with technology to improve the success and retention rate of their students. Using the NCAT course redesign, Cleveland State

Community College's developmental math success rate for the past two years was approximately 75%.

With today's technology capabilities, the new curriculum development in math can foster an active

Of the thirty colleges and universities that took part in the pilot Course Redesign program all were able to improve or maintain student success while reducing costs, on average by 37%.

NCAT

learning style for students with immediate computer-based online help which will make significant improvements in student success in first year math courses. Mission faculty will utilize the technology to update and write new math curriculum. A better academic success rate in mathematics courses can empower our students in their STEM career choices.

At present, the Life Sciences and Physical Sciences do not offer all of the courses required by many of the selective UC campuses for entry into the Life Science majors. Without these core courses—Genetics, Organic Chemistry I and II, and Physics 1, 2, and 3—students are at a disadvantage in a competitive selection process. Computer Science courses also need major

²² <http://www.thencat.org/States/State-based%20Redesign%20Program%20Desc%20woBudget.pdf>

updates and new courses to become viable. The curriculum development in the sciences and math will be a major component of the STEM Center activities.

Renovating the Computer Science Lab and Upgrading Technology: The STEM Center will include a new Computer Science teaching lab that will incorporate smart technology and lockable storage space for equipment required in hands-on classes. New computer workstations and software will allow for curriculum updates and new approaches in instruction. The renovated space will be configured to include 21 computers for open lab use, one classroom with 35 workstations and another room with 40 workstations. Each room will also include a Dell S300wi Interactive projector to be used during lecture. The cabinet space will be used to store replacement parts, tools, and diagnostic equipment.

Undergraduate Research Internship: The benefits of research internships include gains on a variety of disciplinary skills, research design, information or data collection and analysis, information literacy, and communication.²³ Ten to fifteen Mission students will be selected each spring to participate in 12-week research internships with faculty at CSUN, UCLA and local biotechnology companies. Students will be required to submit their academic and career goals in writing. An internship coordinator will serve as the primary liaison for the research interns with the assistance of the Mission faculty and counselors at the four-years and/or lab technician. During internship coordination meetings, the students will be provided all essential information on the courses required for completion of Certificate, A.S. and B.S. degrees in biomedical sciences, and the application process for admission to graduate and professional schools.

²³ *Undergraduate Research as a High-Impact Student Experience*, Association of American Colleges and Universities, Spring 2010, Vol. 12, No. 2. http://www.aacu.org/peerreview/pr-sp10/pr-sp10_Lopatto.cfm

Throughout the course of the internships, the students will be required to write a report on their research project. A major component of the weekly seminar will be a focus on components of a properly written report: Introduction, Materials and Methods, Results, Conclusion and Bibliography. Students will be exposed to library and internet research methods at the university library. Scientists from local universities and biotechnology companies will serve as guest speakers to discuss opportunities in science and research. At the end of the summer, students will submit a final document for publication both online and paper in the Mission Journal of Undergraduate Research, which will be disseminated at LAMC, regional universities and to the biomedical companies.

STEM Transfer and Articulation Activities: Articulation establishes formal, written and published agreements that identify courses (or course sequences) on a “sending“ campus that are comparable to, or acceptable in lieu of, specific course requirements at a “receiving” campus. Mission will work to increase articulation with all four-year colleges/universities in the region. Mission will work closely with the standing Curriculum Committee, expert program advisors, faculty, and articulation officers, to begin the course-by-course process of setting up articulation agreements.

Mission will hire a full-time STEM Transfer and Articulation Specialist who will coordinate articulation and transfer activities. He/she will work to: (1) increase agreements published on ASSIST.org, an online student-transfer information system. ASSIST.org is the official repository of articulation for California’s public colleges and universities and provides the most accurate and up-to-date information about student transfer in California; (2) review curriculum and the curriculum process; (3) review and revise course outlines and catalogs as needed; and (4) review and develop cohesive advising forms and schedules of classes for each

institution to better articulate the transfer process. Successful completion of articulated courses and/or articulation agreements assures the student and the faculty that the student will be able to take the appropriate course(s), and receive the necessary instruction and preparation for their designated major, enabling progression to the next level of instruction at receiving institution.

All STEM students will be required to meet with the Specialist to develop an individualized **Student Educational Plan** based on the student's major, university selected, academic standing, personal/work schedule and support service needed. Advising will also include the timeliness of course completion, identifying major preparation, general education and specific university requirements, assistance with university applications, transfer-related workshops, transitional services, and navigating the overall transfer process.²⁴ In *Assessing Effectiveness and Economic Efficiency in California Community College Transfer Advising*, Short (2009) assessed the effect of student participation in community college-based transfer advising programs. Findings show significant results between students who participated in a transfer advising program with a 14.47% higher transfer rate than students who did not participate.²⁵

The Community College Transfer Task Force (CCTTF) also identifies student advisement essential in providing students with access to current information about transfer requirements at four-year institutions, major preparation, pre-requisites and course requirements. Furthermore, CCTTF reports offering a wide-range of transfer services such as university campus tours, college fairs, and workshops as additional responsibilities of the community

²⁴ Findings and Recommendations Aimed at Strengthening the Community, September 2009

²⁵ Short, Duane (2009). *Assessing Effectiveness and Economic Efficiency in California Community College Transfer Advising*

colleges in preparing students to transfer.²⁶ Mission will host panel discussions inviting experts in the field as well as STEM student alumni who can speak to future transfer students about their transfer experience, acclimation to the university, rigor of STEM educational program, and resources (i.e. research opportunities, scholarships, etc). Four student panel activities – one for each STEM category—will be held each year.

STEM career activities will assist students in connecting their STEM major to career pathways. STEM Career events will include an informational session for each STEM discipline regarding the broad variety of careers a student can enter within a specific STEM major. These events will include an interactive activity using www.EUREKA.ORG to research work environment, job outlook, employment guidelines, earnings, and related occupations.

STEM Outreach at Local Schools and Community: Although many Hispanic parents hope their child will attend college, relatively few understand the choices and tasks that need to be addressed²⁷ (e.g., SAT, AP classes, college applications) as their child moves through the educational process. A larger and more effective information outreach effort on the part of K-12 schools, colleges, and community groups is needed to close these information gaps.²⁸ Communication with Hispanic parents and the greater Hispanic community requires routine, clear, and truthful messages going out through a variety of media – with a genuine receptivity in responses to inquiries coming into the colleges and universities.

First-generation college goers may be disadvantaged by parents who feel that college was not necessary for them, so why should it be for their children. “Low-income,

²⁶ Community College Transfer Task Force
http://www.universityofcalifornia.edu/news/documents/cctransfer_task_force_report_final_091409.pdf

²⁷ Tornatzky, L., Mejia, O., Lee, J. and Tarant, S. *College Choices Among Latinos: Issues of Leaving Home*. Claremont CA: Tomas Rivera Policy Institute 2003.

²⁸ Ibid

minority parents tend to have less access to information regarding higher education opportunities for their children. This problem is pervasive, particularly among families who are not native speakers of English.”²⁹ Hispanic high school students are significantly more likely to drop out of high school before the 10th grade, while those remaining are more likely to have higher education aspirations. These aspirations diminish due mainly to depressed family financial resources.³⁰ We need to do a better job of reaching Hispanic parents, family, and extended community support structures to support improved success of STEM students at Mission.

Mission faculty and staff will work with the local unified school districts and communities to expand the knowledge and understanding of STEM fields and careers. The outreach activities will cover the spectrum from informational brochures and fliers, printed in both Spanish and English, to a community STEM Fair. These informational pieces will focus on the STEM fields offered at Mission and include career opportunities (including annual wage figures) and will be distributed to high school juniors and seniors and their parents.

The Community STEM Fair will give students of all ages and our community an opportunity to explore STEM fields in a festival-type atmosphere. STEM-based competitions will be held among, and occasionally between, students from kindergarten to graduate level. Each of the STEM disciplines will have displays and information available.

Mission College has a large, well known and active arts program. Because art is important to children, the art department will be a large component of the STEM Fair. Mission’s Art Department, Early Childhood Ed and community artists will provide hands-on art projects

²⁹ Ibid

³⁰ *Access Denied: Restoring the Nation’s Commitment to Equal Educational Opportunity*. The Advisory Committee on Student Financial Assistance Washington, DC. February 2001.

that come with a lesson in science, technology, engineering and or math. According to a local artist:

What people don't understand is that all art is based on science, technology, engineering and math. As a potter I have to understand chemistry to make glazes and the properties of the elements I'm using. Operating a kiln, whether a new one with a computerized kiln sitter or a wood burning kiln takes knowledge of thermal dynamics and technology. I'm proud to admit that some of my sculptures are, in all actuality, engineering marvels – physics and structural needs have to be solved. And math is so important, the shrink rate of my clays (geology) run from 7 – 12% and if I don't get that right an entire series can end up in the shard pile. When children come to my studio one of the first things that I tell them is that if they want to be an artist, dancer, or musician, then they need to take every science and math class they can get their hands on. I wish I had.

By matching the beauty and fun of art with the beauty and fun of math and science we expect to increase the desire for STEM courses and ultimately the number of students graduating with degrees in STEM fields.

Quality of Project Personnel

a. The qualifications of the project director -- Mike Reynolds 1.0 FTE

With M.S. and B.S. degrees in Biological Sciences, Mr. Mike Reynolds is highly qualified to oversee the grant activities. He has both the grants and teaching experiences at Mission College where he has served as the Coordinator of the NIH Bridge Program and state-funded Partnership for Excellence Program. From 2004 to 2007, he also served as the Director of the U.S. Department of Education Minority Science and Engineering Improvement Program (MSEIP) which focused on increasing minority transfer students in science. He is currently an Assistant Professor of Life Sciences teaching Biology, Anatomy, Physiology and Environmental Science. Mr. Reynolds will have direct access to executives at Los Angeles Mission College.

Minimum Qualifications for Project Director – Masters in Science and Federal Grant

Management Experience Mr. Reynolds has been teaching life sciences for 23 years. He has

spearheaded major science grants at Mission and has extensive experience outside the campus developing interactive research program for undergraduates, training fellow teachers, and initiating new strategies to target minority students in science education at University of Southern California, school districts in Southern California, and private corporations.

Education M.S. and B.S. degrees in Biological Sciences, Stanford University

Job Responsibilities Establish, maintain, and communicate the goals and objectives of the project with college personnel and ensure consistency with the college's mission and goals; Implement the everyday work of the project and grant objectives; Work with project staff to meet project goals and objectives; Serve as the primary contact for U.S. Dept. of Education; Assist individual faculty members, departments; Work with other college programs and services to insure the success of the project; Remain thoroughly informed regarding HSI STEM and U.S. Dept. of Education policies and grant terms/conditions, and assure that the project operates in total compliance; Oversee the preparation and monitoring of reports relating to the project for both the college and the U.S. Department of Education; Authorize all HSI STEM expenditures and maintain control over the budget and responsibility for appropriate utilization of funds; Expedite all equipment and supply orders, delivery, and installation; Ensure that all external assistance, consultants and other agreements are executed and conducted according to schedule and standards; Ensure the evaluation process is fully implemented; Ensure incorporation of successful aspects of HSI STEM activities into the ongoing operation of the college; and Provide project publicity and coordination of special events.

b. The qualifications of key project personnel

The majority of the services the grant’s key personnel will be involved in one-time activities that, with minimum on-going costs, will make a lasting change for the students of Los Angeles Mission College.

Program Specialist – Project Management—New Hire—1 FTE	
Education	Bachelor’s Degree with at least 1 year of experience in federal grants management
Experience	Knowledge in federal grants management and recordkeeping Knowledge of budget management
Responsibilities	Work with the Project Director to direct and oversee implementation and operation of all Activity components at their institution. Oversee staff and faculty recruitment and development activities. Supervise the day-to-day functions of all STEM Center staff. Assure effective overall project accountability. Monitor the budget and prepare monthly progress reports. Assume responsibility for the timely completion and evaluation of all development and pilot test phases and project objectives.

Outcomes Analyst—Project Management—.25 FTE	
Education	Bachelor’s Degree in Statistics, Information Tech., Math or related field
Experience	Knowledge of variety of data collection, evaluation and research methods; Experience or skills with spreadsheets, importing/exporting and reporting of data; Advanced computer and web skills
Responsibilities	Support the Project Director in the establishment of an electronic student tracking program specific for the STEM Center and project activities. Provide vital statistics and information to faculty and administrators to utilize in meeting the needs of Hispanic and minority students. Provide technology support methods to assist students and faculty in submitting and analyzing data and student artifacts through electronic means/advantages to utilizing them. Seek to create an atmosphere where students and faculty are eager to participate in a collaborative learning environment

STEM Transfer and Articulation Specialist—New Hire—1 FTE	
Education	Master’s Degree in Counseling or related field
Experience	Two years experience in education counseling or programs for minority and/or low-income students
Responsibilities	Responsible for developing and implementing the student services portions of

	transfer, including coordination of articulation agreements between Mission and four-year institutions, Summer STEM Academy orientation, and academic advising for probationary or at-risk STEM students. Provide academic counseling for students interested in STEM major and careers. Implement in-depth Educational Plans and conduct probationary workshops and seminars. Track and maintain data and files in regard to student progress.
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STEM Center Coordinator—New Hire—1 FTE	
Education	Master’s Degree in Education or one of STEM Disciplines
Experience	Two years experience in academic support role; knowledge of test preparation and/or college readiness instruction (i.e. GED, CAHSEE, Escalante Program); knowledge in curriculum development and program coordination
Responsibilities	Work with the Project Director, faculty and STEM Center staff to ensure the objectives and goals are met and outcome data is gathered and used for informed decision making. Ensure the Center’s functionality, develop and maintain partnerships with faculty and staff. Provide leadership for curriculum development and faculty training.

Undergraduate Research Internship Coordinator—New Hire—.8 FTE	
Education	Bachelor’s Degree in STEM related field
Experience	Two years experience in related academic setting Expert knowledge in lab and field work
Responsibilities	Work with faculty members at 4-year university labs and scientists at private labs to coordinate internship opportunities. Work with the Project Director to ensure the objectives and goals are met and outcome data is gathered and used for informed decision making. Identify learning objectives and prepare students for lab setting. Publish online and paper research journal.

STEM Outreach Coordinator—New Hire—.3 FTE	
Education	Preferred Master’s Degree in Marketing, Human Services, or related field Bachelor’s Degree required; Bilingual (English/Spanish)
Experience	Explicit knowledge of the STEM professions and program sequences, admissions and financial aid processes. Experience working in a STEM-related program, or two years of outreach experience. Experience working with and thorough knowledge of Hispanic cultures/ minority populations. Strong oral and written communication
Responsibilities	Provide outreach efforts for STEM Center with local high schools, provide

	information on academic/vocational and other related student support services at Mission, and assist with completion of Mission college application and other admission paperwork including financial aid.
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STEM Supplemental Instruction Tutors – Hourly	
Education and Experience	Completed all lower division courses and enrolled in upper division or graduate student at an accredited four year college or university with a major in math or science.
Responsibilities	Tutor students individually or in small groups mostly on transfer level math and science. Present workshops and/or lead study groups. Assist in developing materials for student workshops.

Adequacy of Resources

Mission is requesting approximately \$870,000 per year for five years, a total of \$4,345,899 to substantially change the way of educating thousands of its students and bringing knowledge regarding higher education and STEM fields and careers to entire communities. It is estimated that 9,060 participants per year will be enrolled in newly developed courses or courses with alternative strategies implemented in STEM curriculum or participate in STEM transfer outreach and transfer activities which calculates out to project cost of **only \$95 per participant** - \$4,345,899 divided by 45,300 (*9,060 students X 5 years*). Over the five years of this HSI STEM Project, improvements initiated and implemented will positively impact all areas of the college and its students.

The budget of \$4.3 million for five years has been thoroughly vetted and researched by staff across multiple units of the college. The Los Angeles Community College District has strict fiscal policies and checks on the construction of building and major renovations such as the laboratory Mission is proposing. The main costs associated with this project, the major renovation of existing classrooms, are within these guidelines. Estimates have been gathered and

faculty in STEM departments has taken an inventory of existing equipment and technology.

Finance office staff, working with administrative leaders, have validated that costs for staffing and equipment are appropriate and reasonable.

Mission is taking advantage of its existing programs to ensure that services are not duplicated, but that grant program activities will enhance and coordinate with other offices like the Math Center, Teacher Prep Program, TRIO, and CTEA. The Project Director will work closely with these other programs through consultation at regular steering committee meetings, and report to campus administrators and governance committees.

The college has an existing Transfer Center and articulation agreements with many colleges in the region that are managed by a designated Articulation Officer. The Project Director will work closely with the Articulation Officer and the Transfer Articulation Specialist to coordinate meetings for faculty-to-faculty dialogue to improve curriculum alignment across campuses and between Mission and four-year transfer institutions. The goal is to use these meetings as a forum for improving curriculum offerings and making Mission College students “transfer ready” for success in four -year STEM classes.

College leaders believe that the grant request fits in well with the resources and size of the institution’s current operational budget and program offerings. Most importantly, because of Mission’s strong commitment to program sustainability, the initial grant investment will have continuing impact long after the five year funding period has passed. Increased student retention and graduation rates combined with decreased failure rates in gateway math, English and science courses will improve the institutions’ long-term fiscal outlook. Rather than use the grant money to implement a special program targeting only a few hundred Hispanic students each year,

Mission has taken a tougher route of working to infuse best practices for Hispanic student success not only across the College, but throughout our feeder school districts and community.

All costs have been researched and itemized, as detailed in the budget. Salary levels and benefits are fixed according to legally negotiated agreements - they tend to be high compared to national averages, but are normal for the Los Angeles area. Salaries include 5% COLA increases dictated by the State as well as the Los Angeles Community College District (LACCD) salary step increases. Salary ranges are mandated by negotiated contracts between employee unions and LACCD and determined by job classification pay scales.

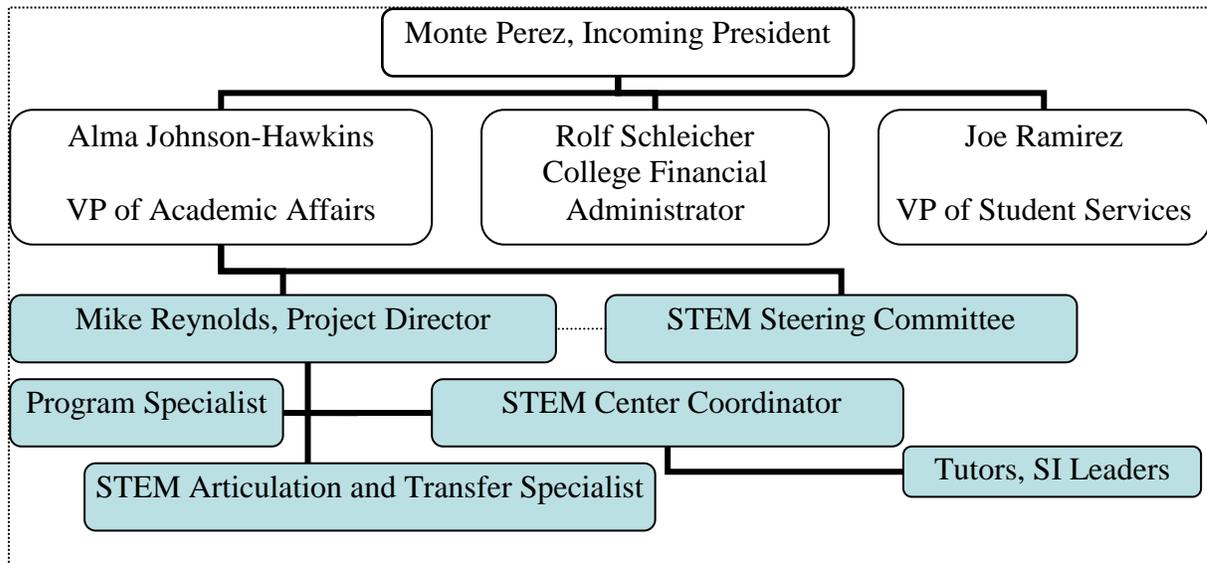
Reasonableness of Project Costs	
Post-Grant Sustainability	Incoming President Monte Perez has committed to sustaining the activities developed thru this project by strategically growing the STEM disciplines during and post grant. Resources including classroom space as well as instructional costs will be sustained in the College’s budget to continue the efforts initiated by this project.
Replicability of Project	Replication of project activities will be made possible by dissemination of information through the project website, the <i>Project Policies and Procedures Manual</i> , and project evaluation reports to help other colleges/universities learn from or replicate Los Angeles Mission College grant-funded initiatives. See “Management Plan” and “Project Evaluation” regarding the documents/website.
Student impact	Projected number of unduplicated students over the five-year project period who will positively benefit from project activities are calculated based on numbers of students who: <ol style="list-style-type: none"> 1) Participate in STEM tutoring in the newly designed STEM Center 2) Participate in STEM Summer Academy 3) Participate in STEM Fair
Cost Per Participant \$95	By the end of the grant period, this project will have affected: <ul style="list-style-type: none"> • 20,000 high school students and community members, • 25,000 Mission students, • 300 staff and faculty = 45,300 Total \$95 per participant.

Increased community involvement by the faculty, staff, administration and students of Mission and successful implementation of this proposal may increase the likelihood that local industry will work more closely with Mission to procure additional funding for program needs,

student scholarships, and to obtain funding from related grants for increased preparation for a tight job market.

Project Management

Mission Project Organization Chart



Mission’s new President, Monte Perez, has requested that a **STEM Steering Committee** be directly involved in the management, implementation and evaluation of this project, as the grant initiatives and successful outcomes will positively address and impact core institutional goals. Operational management authority will be delegated to Mr. Mike Reynolds, a highly experienced Project Director. **The Steering Committee** will meet every other week for the first three months of the grant, shifting to quarterly after that. The charge of this committee will be to communicate with campus constituencies about progress of activities toward development of a means for realignment of courses and articulation; monitor increases in numbers of students receiving degrees and/or transferring to four-year institutions in the STEM fields; provide outreach to the community; serve as experts in subject area content; provide guidance and oversight to eliminate duplication of effort; make recommendations regarding personnel,

expenditures, consultants; review reports and provide input; suggest needed modifications of project; meet with external consultants; and assist with institutionalization. The committee will include VP of Academic Affairs, VP of Student Services, Deans, College Financial Administrator, and STEM Division Chairs.

The project's success depends upon good communication and coordination with existing offices on campus. The Project Director will coordinate outreach activities for Hispanic and low-income families by working closely with the Outreach and Admissions Offices. As indicated above, the Project Director will have regular steering committee meetings with program staff from other departments and STEM faculty. All of the bridge activities, outreach efforts, and faculty-to-faculty dialogues will be coordinated and monitored by the Project Director to ensure that the goal of improving STEM degree completion and transfer success are foremost in the minds of college staff and faculty.

Task	Responsibility	Results or Measurable Indicator	Dates
Year One Start-up and Annual tasks			
Communication about HSI-STEM award and begin start-up process	Mission Executive Staff	Email notification on and off campus to constituents involved	Upon notification
Steering and Advisory Committee formed and meetings scheduled. Overview of Roles and responsibilities.	PD, Exec. Staff, Steering Comm	Communication lines established to improve effectiveness and promote institutionalization. Meeting dates scheduled and published	Oct – Nov 2011
A thorough review of the STEM Center renovation and equipment purchase	PD and Deans	All Mission, LACCD, CA and federal policies followed with appropriate documentation on file	On-going
Finalize fiscal contracts and establishment of program on campus and District	PD and Admin Services Office	Monthly Time & Effort Reports, Interim Report and Annual Progress Reports compliant with EDGAR and Circular A-21	On-going
Identify, gather quotes, purchase and install equipment	PD, Faculty, Facilities, IT	Equipment installed and ready for use by personnel and students	As needed
Select and release faculty and staff working on project activities following established Mission release time and part-time hiring procedures	PD, Leads, Deans, Division Chairs	Faculty and staff selected; course coverage planned in preceding term; teaching loads and staff assignments made clear	Each semester
Steering Committee meets quarterly or more often as necessary; fall (Sept) meeting entails annual review of goals, timelines and strategies	PD, OIRP, Steering Comm	Str Com meets quarterly; fall (Sept) meeting used to assess the overall annual progress toward project goals and objectives	Quarterly
Ongoing meetings with curriculum task force, and advisory committees on instruction, articulation, and transfer	PD, Leads, faculty and staff	Data results shared and goals redefined as needed	On-going
Ongoing communication and meetings with articulation officers at four-year institutions, ASSIST.org, Academic Affairs Department, and department chairs	PD, Trans/Artic Specialist	Annual increase number of articulation agreements with four-year, course curriculum including pre-requisite review and SLO (Student Learning Outcome), tutoring component.	On-going 2011 - 2016
Evaluation key personnel	PD	Evaluation forms completed	Annual
Review and analysis of annual outcomes	PD, OIRP, faculty and staff	Annual Performance Report filed and online data charts published	Annual
Summative and formative evaluation of impact	PD, OIRP,	Progress toward fulfillment of annual	Annual

activities have on achieving STEM goals and objectives; recommendations for institutionalization made to President and Exec.Brd	Analyst, Steering Comm., External eval	objectives and five-year benchmarks noted and documented; plan for following year refined in light of evaluation	September
Year One 2011-2012			
Begin renovation of the STEM Center Computer Science Lab	PD, Administration	Plan approved, contracts approved and signed, current occupants moved to new office	12/1-4/12
Develop and implement specialized transfer counseling for STEM students focusing on educational options	Transfer/Artic Specialist	Student ed plan designed, intake procedure and files in place	1/12 on
Create bilingual outreach materials for the STEM Center and its activities	PD, Outreach Coord.	Materials drafted and approved for print	1/12
Develop new strategies in math tutoring and SI	Ctr Coord., Faculty	Software and textbooks reviewed and selected, training conducted, materials for sessions created	1/12-4/12
Establish outreach strategies in feeder schools and community	PD, Outreach Coord.	Meetings with feeder schools and community organizations scheduled and strategies outlined	2/12-7/12
Develop curriculum and plans for Summer Academy; design modularized courses for pairing selection; plan academic activities, design student selection process	PD, Transfer Specialist, faculty leads	Faculty released, curriculum developed and approved, Academy classes scheduled on master calendar, activities identified and designed; first STEM cohort identified and enrolled	4/12-7/12
Develop curriculum and plans for Math Prep, test software for lab compatibility, prepare pre and post test	Ctr. Coord., IT	Software identified and purchased, pre and post tests approved by Math Dept. and Assessment Center	4/12-7/12
Develop curriculum and plans for Bridge activities, select guest speakers, form partnerships with student service offices and organizations	PD, Center Coord., Transfer Specialist	Program finalized, student ed plan deisnged, guest speakers scheduled, partnership meetings scheduled and activities defined	4/12-7/12
Curriculum development to infuse technology across STEM disciplines	PD, Curr. Dev. Expert, Center Coord., Faculty	Faculty projects defined to strengthen curriculum, appropriate technology selected and tested, strategies with IT recorded	4/12-7/12
Develop STEM Fair	PD, Outr. Coord., Facilities	Fair participants selected, promotional pieces developed, fair logistics worked out	7/12-9/12
Year Two 2012-2013			
Pilot first STEM Fair to increase awareness and	PD, Outr. Coord.,	Outreach method focusing on students of first	10/12

interest in the community	Administrators	generation immigrants and families achieved	
Pilot new strategies in math tutoring and SI with ongoing training for tutors and SI leaders	PD, Center Coord., Tutors/SI	Online progress reports and educational development tracked for participants	10/12-2/13
Develop STEM curriculum in Computer Science to pilot in spring	PD, Curr. Dev. Expert, Faculty, Artic Specialist	Appropriate technology selected and tested, curriculum developed, articulation reviewed	10/12-2/13
Develop online videos for STEM instruction in higher level math courses	Ctr. Coord, faculty	Webcast videos developed and uploaded, viewership tracking developed	10/12-1/13
Formalize undergraduate research project with four-year universities and private corporations Establish internships in various labs	PD, Intern Coord, 4-yr faculty and lab tech	Internships coordinated and interns placed in summer, internship handbook written	2/13-6/13
Pilot second STEM Summer Academy, Math Prep, and Bridge activities	PD, Ctr. Coord. Transfer Spe, faculty leads	Using data from first pilot, increased effectiveness, and progression in math, sci, and Eng	6/13-8/13
Year Three 2013-2014			
Pilot second STEM Fair to increase awareness and interest in the community	PD, Staff /Faculty, CommunityVol	Outreach method focusing on students of first generation immigrants and families achieved	11/13
Pilot new strategies in math tutoring and SI with ongoing training for tutors and SI leaders	PD, Ctr Coord Math tutors and SI	Online progress reports and educational development tracked for participants	10/13-2/14
Develop and implement STEM career activities	PD, Transfer Spec., Faculty	Specialized career counseling developed for STEM students focusing on STEM career options	10/13-2/14
Develop and pilot STEM curriculum and instruction in Physical Sciences to pilot in Spring.	PD, Comp. Sci. Curr Spec	Appropriate technology selected and tested, curriculum developed, articulation reviewed	10/13-2/14
Establish internships with CA State Uni, Northridge and CA Institute of Tech labs	PD, Intern Coord, 4-yr faculty and lab tech	Internships coordinated and interns placed, research journal published	4/14-8/14
Pilot third STEM Summer Academy, Math Prep, and Bridge activities	PD, Transfer Spe, Ctr. Coord faculty leads	Using data from second pilot, increased effectiveness, and progression in math, sci, and Eng	6/14-8/14
Year Four 2014 -2015			
Pilot online instruction for STEM disciplines	PD, Center Coord, Curriculum Spec.	Webcast videos developed and uploaded, viewership tracking developed	10/14-1/15
Develop new curriculum content technology	PD, Comp. Sci.	Appropriate technology selected and tested,	10/14

innovations in life sciences to pilot in Spring	Curr Spec	curriculum developed, articulation reviewed	-2/15
Continue to coordinate undergraduate research internship opportunities at USC and Transmembrane Biosciences, Inc.	PD, Fac Intern. Coordinator	Internships coordinated and interns placed, research journal published	4/15-8/15
Pilot STEM Community event to increase awareness and interest	PD, Staff /Fac, CommunityVol	Outreach method focusing on students of first generation immigrants and families achieved	4/15
Pilot STEM Summer Academy, Math Prep, and Bridge activities	PD, Comp. Leads, Fac	Using data from fourth pilot, increased effectiveness, and progression in math, sci, and Eng	6/15-8/15
Year Five 2015-2016			
Update tutor training handbooks	PD, Ctr Coord,	Training handbook published	10/15-12/15
Solidify undergraduate research project with four-year universities and private corporations Increase the number of laboratory internships	PD, Intrn. Coord Faculty	Publication review and online updates Continuation meetings scheduled for post grant period	1/16-4/16
Review, analyze, and update technology infused curriculum and instruction	Project Director Comp. Sci.	Support structures, both for students and on an institutional level, developed/strengthened	4/16-6/16
Final evaluation of activities	PD, key personnel	Evaluation report filed, post grant plan established	6/16-7/16

Mechanisms to Monitor Quality will be in place to provide *continual feedback* for project

improvement and will include the following:

Startup Procedures: President will communicate the authority and scope of responsibility of Project Director and other key project staff and confirm Steering Committee members. Fiscal procedures will be fully consistent with institutional, federal and state requirements per GAPS.

Project Staff Meetings will be scheduled a minimum of once a month. Initially, meetings are

anticipated to be every two weeks. Other college faculty and staff will be invited, as appropriate.

Monthly Time and Effort reports will be completed for each employee paid by *HSI STEM* funds as approved in the grant. Reports will be submitted to the PD office monthly.

Progress Reports submitted by monthly by project staff to the PD will serve as part of the on-going monitoring/improvement loop. Reports will include: travel, consultants (reports/info received), equipment updates, new practices, and formative evaluation issues. Unanticipated delays and alternative solutions and any requests for assistance will also be noted.

Quarterly Executive Summary Reports: The PD will synthesize reports into *HSI STEM Executive Summary Reports* to be distributed to college administrators, project staff and Steering Committee. This summary will be a composite, reflecting overall progress and quality toward objectives and activities assuring assistance as needed from Mission leadership.

Performance Reports: Interim, Annual and Final Reports will be submitted to the federal *HSI STEM* program office to document substantial progress toward achievement of objectives.

Communication with Federal STEM HSI Office: Grants compliance personnel will be kept apprised of rules and policy changes from the program office, as well as changes in grants management or fiscal issues in EDGAR.

Project Policies and Procedures Manual based on EDGAR and *HSI STEM* guidelines, will be developed by the PD. The manual will specify policies/procedures, detail staff responsibilities, provide job descriptions, provide examples of all required forms, and clarify reporting procedures, including timelines for required Interim and Annual Reports.

Strategies For Information Distribution and On-line Feedback Capacity	
Project Website and Campus Newsletters:	The Project Director will establish a website with a mechanism for feedback by all constituencies. Mission will use existing internal information systems, such as in-house newsletters and intranet bulletin boards and the college website.

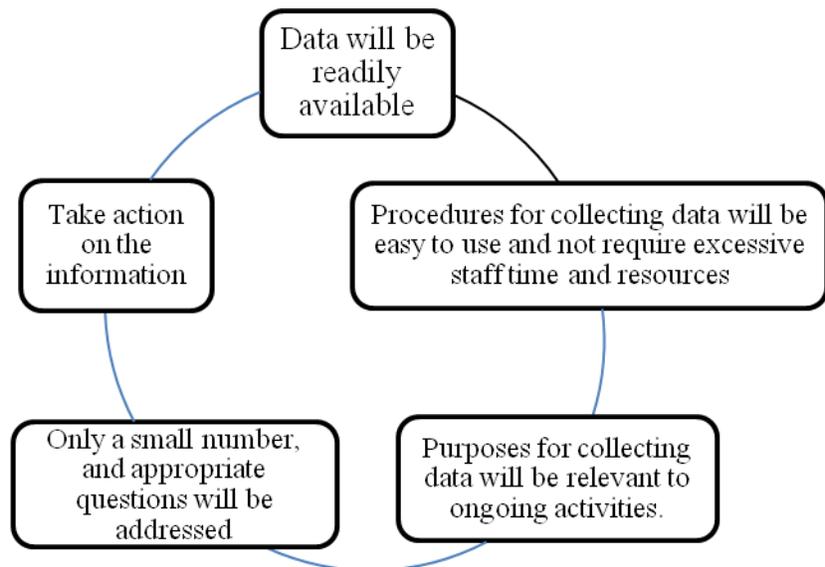
HSI STEM Bulletins:	An HSI STEM Newsletter/bulletin will be printed quarterly and will feature special topics such as exemplary pilot projects, new articulations, activities and improvements.
Again, initiatives begun will continue post-grant. Mission has worked to link this project to Mission program review processes and institutional student learning outcomes initiatives, as well as building ever stronger relationships with the Hispanic community and feeder school districts.	

Project Evaluation

Data-Based Decision Making³¹: Mission will engage in two kinds of data-based decision making—at the college level and at classroom level, with results and decisions from the college level leading to the decisions at the classroom level and vice-versa.

The Office of Institutional Research and Planning will work closely with the HSI STEM team to provide an adequate and consistent flow of data appropriate to the project and to measuring outcomes and how those outcomes will affect the college and students. Not only will the data be readily available, but it will be presented in an understandable format and the Office of Research and Planning will be available to help with further interpretation.³²

Time will be allocated for faculty and staff to study and think about the data available to them, to collaborate in interpreting data, and to collectively develop next steps and actions. All data collected



³¹ http://www.rand.org/pubs/occasional_papers/2006/RAND_OP170.pdf

³² http://eff.csuchico.edu/downloads/MarylinAve_Story.pdf;

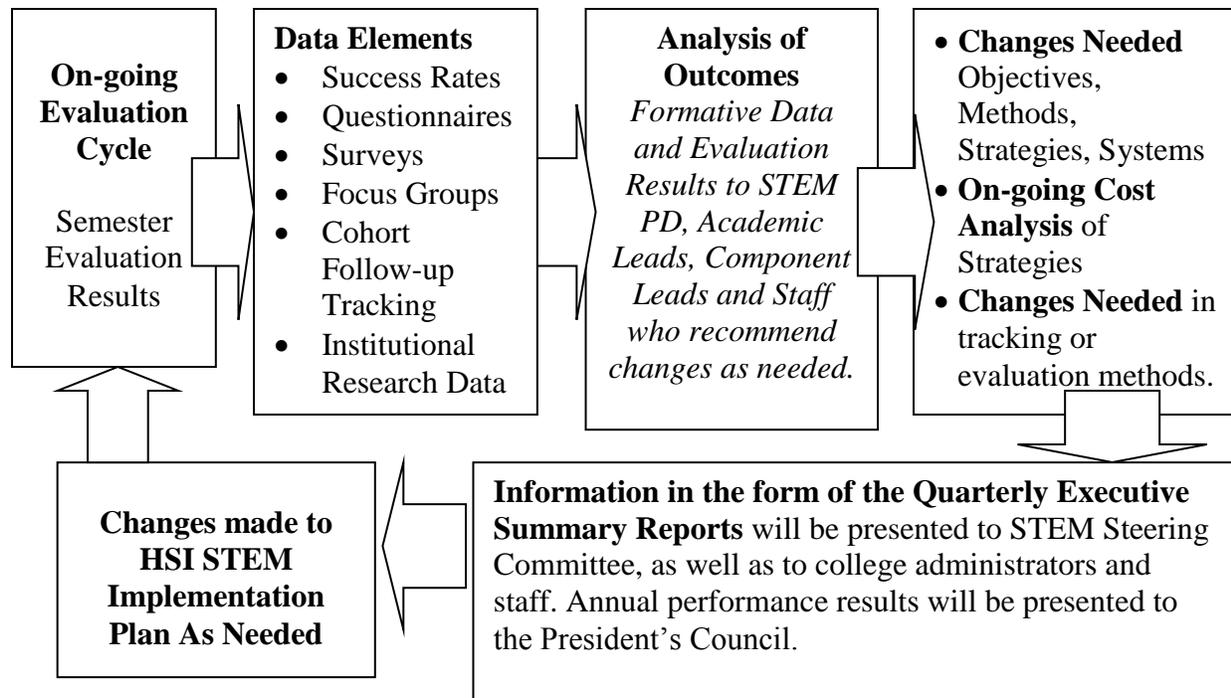
and presented will be relevant to the HSI - STEM project and only the HSI - STEM project and the impact being made on the college. Individuals will be assigned to filter and help translate data into usable knowledge³³.

Faculty, staff and administration not currently using data for their decision making procedures will be trained in data-use for their decision making. Training and support are needed and will be made available to assist faculty and staff in identifying how to act on knowledge gained from data analysis, such as identifying best practices and resources that address problems or weaknesses that emerge from the analysis.

Mission will develop and implement a comprehensive reporting system to deliver data services, research and management information in a manner that identifies the gaps in student assessment and achievement. Purposeful data collection such as student enrollment, achievement, and retention and program data will be used to create a more complete view of student achievement and as a starting point to increase dialogue within the educational community. Data efforts are not limited to the types of data collection but its reporting patterns which will reveal strengths and weaknesses in the programs and services. This will allow for new approaches in deciding how and where to make changes, identifying patterns of outcomes and design strategies to enhance student learning, and improving student success rates and equity in education outcomes across various racial/ethnic and income groups.

Formative and summative evaluations of the project will be utilized to assess the effectiveness of each initiative and the overall effect on retention and graduation rates of Latino students.

³³http://www.rand.org/pubs/occasional_papers/2006/RAND_OP170.pdf



Three Key Features of Los Angeles Mission College Project Evaluation Design Data Types to be used for Decision Making	
Formative/ Process Evaluation <i>Focus on Improvement</i>	To assure quality of program management, formative or process evaluation will be conducted to monitor implementation. The formative evaluation plan will include indicators of successful program implementation, including GPRA Performance measures, formative evaluation cycle, measurement of objectives and outputs (i.e., satisfaction surveys of Latino students participating in the STEM Summer Academy, Undergraduate Research Internship, STEM Tutoring and Supplemental Instruction. STEM Transfer, and outreach Programs).
Summative/ Outcome Evaluation <i>Shared for Continuous Improvement</i>	Data for the summative/outcome evaluation will be collected throughout the project period and be completed in annual increments and at the end of the funding period. The plan outlines outcomes and objectives of the HSI STEM project and includes pre- and post-tests, baseline and final evaluation, data relative to curriculum redesign as well as data on transfer, retention, and academic success rates.
Controlled Comparisons	Comparisons between program participants and non-participants will be made to assess impact of reforms and on retention and graduation of Latino students

Data Collection: A variety of data will be compiled to address the evaluation questions. Data will include enrollment, retention and graduation reports and course failure rates, survey data

collected from students participating in various components of the project such as STEM Summer Academy, Undergraduate Research Internship, STEM Tutoring and Supplemental Instruction as well as faculty participating in the curriculum development process. Data will be collected to monitor fidelity to the program design. Outcome data will be collected on a quarterly basis to assess if targets for improvement are on track throughout the program. Where possible, all data collected on individual students will be linked by a student identification number to allow tracking across multiple elements of the program. Data from the most recent academic year will be used to establish baseline data for the project.

Data Analysis Plan: The overall evaluation of the success of the project at Mission will track specific indicators for those participating in the programs. These measurements will be indicated by a series of outputs related to implementation of program activities (i.e., descriptive statistics) in areas such as: participation in the STEM Summer Academy, tutoring and supplemental instruction, STEM transfer, and high school and community outreach. In addition, outcomes will be compared each program year, including progression toward degree attainment and transfer rates. Additional descriptive and inferential statistics will be conducted based on analysis of student survey instruments, for pre- and post-test instruments.

One benchmark for project improvement will be an annual assessment of how the outcomes of the Mission STEM performance compare to the GPRA Performance measures: enrollment, persistence, graduation and cost per successful outcome.

Evaluation Process Tailored to College: On-going and time-specific evaluations will be used to make judgments, improve effectiveness and inform decisions about the project in order to improve the program. Mission will conduct internal quarterly evaluations as part of an on-going HSI - STEM program review.

Proposed evaluation methodology will positively influence planning and decision-making:	
Reforms and Implementation decisions	Determine the means for carrying out and improving planned reforms and strategies; identify needed modifications to planned timelines, reform strategies and activities.
Feedback for Continuous Improvement	Determine if HSI Summer Academy, Tutoring and Supplemental Instruction, STEM Transfer and Outreach programs serve as an effective tool for degree attainment and transfer; determine effectiveness of curriculum development, the technology-infused teaching, and the STEM Center design.
Program Reporting	Evaluation outcomes will be used to complete Interim, Annual Progress, and Final Reports required by HSI STEM statute.
Internal/External Communications	Evaluation findings will be used in institutional effectiveness reports, and in information to internal and external constituencies.

Responsibility for Evaluation: The following table lists the roles and responsibilities of the university and external evaluator for effective evaluation of this project.

MONITORING + ON-GOING EVALUATION \rightleftarrows FEEDBACK FOR CONTINUOUS IMPROVEMENT	
Responsibility for Evaluation	
Project Leadership: Project Director, Research Analyst with assistance from Office of Institutional Research; Component Leads and External Evaluator.	
Steering Committee	Will serve as resource and sounding board for formative evaluation issues and summative evaluation decisions (institutionalization issues). Committee will serve as an internal monitoring group to provide ongoing assessment of the project’s progress toward achieving the stated objectives. (See <i>Management Plan</i>)
Evaluation Experts	Research Analyst at Mission will construct formative/process and summative/outcome data collection plans, monitor effectiveness, suggest changes as needed.
	External Evaluator will make multiple visits to work with project leadership.
Responsibility for Data Collection and Continuous Improvement: Project Director, Administrative Assistant, Research Analyst, Component Leads	
HSI-STEM Five Year Measurable Objectives	Data elements
By September 2016, the number of Hispanic and other low-income students attaining degrees in STEM fields will increase from a 2009-10 baseline of 21 to 42 (an increase of 100%).	Graduation records
By September 2016, Hispanic students transferring with a STEM degree or transfer certificate from Mission to four-year institutions will increase 200% from 2009-2010 academic year baseline of 7.	Transfer data from California Postsecondary Education Commission, Transfer Pathway
By September 2016, progression rate of college-level math enrollment relative to remedial math will increase from 6% to 15%.	enrollment patterns, course success rate,
By Fall 2016 100% of revised STEM courses will have with approved articulation agreements between Mission and four-year institutions over a base of zero(0	Annual tracking of articulation agreements by Transfer Center. Faculty collaboration across segments

By Fall 2016, 25% of the Hispanic students taking part in Summer Bridge, Math Prep or Summer Academy will register for a minimum of one STEM course within two Semesters of their participation.	Attendance records (Bridge, Math Prep, Academy), registration, class enrollment records
Students taking part in math tutoring and SI at the STEM Center will succeed in college level math in rates 15% higher than those who do not use the tutoring/SI services.	STEM Center records, class grades, student satisfaction survey,
By 2016, students taking part in research internships will persist to graduation with a degree in a STEM field or Transfer Certificate at a rate 20 times greater than those not participating in research internships.	Surveys of enrolled students and declared STEM majors for attitudes about the factors that encouraged their selection of a STEM major

Third Party Independent Evaluation: An outside evaluator will be hired to conduct annual evaluation on the effectiveness of the STEM project at Mission. The evaluator will: 1) Assist with refining the evaluation plan annually; 2) Assist and offer advise regarding evaluation data collection and analysis; 3) Review and offer advice about evaluation instruments; 4) Hold quarterly teleconferencing meetings with the Project Director and key staff to review progress in project implementation and accomplishing evaluation tasks; and 5) Produce an annual written evaluation report based on documents and data provided by the Project Director. The report will present findings and recommendations.

Final Reports on Success of Grant: At the completion of the project, a comprehensive summative evaluation will be prepared. In addition to an analysis of the grant’s original objectives vs. actual accomplishment of those objectives, the report will include the following: 1) budget expenditures, 2) a comparison of performance indicators with final results, and 3) a summary of the ways the successful completion of this project has strengthened degree attainment and graduation rates of Hispanic students at Mission. The PD will detail the ways 4) the objectives were accomplished 5) the ways the project has affected the policies, procedures, decision processes and fiscal allocations of Mission, and 6) plans for future actions.