Santa Barbara City College
HSI STEM & Articulation: SCIENCE TRANSFER PROGRAM (STP)
April 2011

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Budget Narrative Found on Budget Detail Form

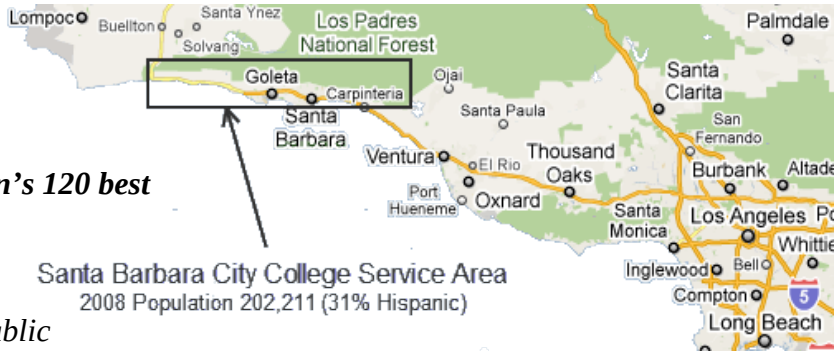
SANTA BARBARA CITY COLLEGE

HSI STEM & Articulation: SCIENCE TRANSFER PROGRAM (STP)
IMPROVING STEM DEGREE COMPLETION, TRANSFER RATES, ARTICULATION, AND STUDENT OUTCOMES

1. NEED FOR THE PROJECT

The STEM Transfer Program (STP) proposes to address the serious problem at Santa Barbara City College of Hispanic underrepresentation and unbalanced student outcomes in science, technology, engineering or mathematics (STEM) programs, including extremely low transfer rates to two of the most essential universities for student transfer – the University of California Santa Barbara (UCSB) and the California State University Channel Islands (CSUCI). In the proposed project, Santa Barbara City will address the two STEM absolute priorities by increasing the number of Hispanic and other low income students who attain degrees in STEM fields and by strengthening and improving transfer and articulation agreements between SBCC and 4-year transfer institutions. This project will also address the one competitive preference priority by applying a model of data-based decision-making to improve postsecondary student outcomes relating to enrollment, persistence, and completion and leading to career success.

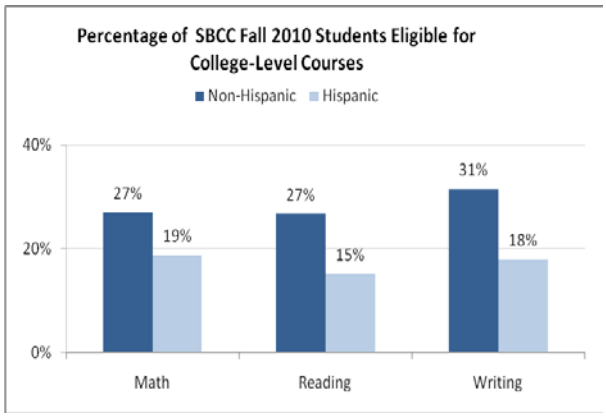
Magnitude of the Need Santa Barbara City College is a comprehensive two-year community college located in the south coast region of California comprised of the Santa Barbara/ Goleta/ Carpinteria communities.



*Ranked as **one of the nation's 120 best community colleges** (from almost 1,200 accredited, public community colleges nationwide) in the country by the Aspen Institute College Excellence*

Program, Santa Barbara City College aims to significantly improve college student outcomes insisting on high standards for learning, college completion without delay, and to serve as a training ground for jobs that pay competitive wages. The direct service area for Santa Barbara City College includes a highly rural mostly agricultural region to the north and a densely populated area in south and southeast increasingly characterized by growth, economic extremes and diversity. Hispanics are the largest and fastest growing segment of the population in the service area—now over 54% of K-12 enrollment (compared to 49% statewide, CA Department of Education, 2010) and 32% of SBCC enrollment (2010) . As of Fall 2008, ***51%*** of the SBCC Hispanic students, ***are also low-income*,** **at which time SBCC became a federally designated Hispanic Serving Institution.** All minority groups at the College are now at proportions that exceed those in the district adult population fostering a climate of social and cultural diversity. However, Hispanic students fall through the educational pipeline cracks at *every point* along the educational pathway and the College is falling short of meeting its mission to improve the educational attainment of these students. Santa Barbara City College must increase the effectiveness of its programs and services to better serve its students and to promote student entry into STEM fields. The opportunities at the California State University Channel Islands (CSUCI) and the University of California, Santa Barbara (UCSB) for Hispanic achievement are exceptional, yet the majority of Hispanic students in the Santa Barbara City service area are underprepared to enter the California university system directly. **High Levels of Remediation for Hispanic students**. The majority of Santa Barbara City College students are ***academically unprepared for direct admission to a four-year college*** and most ***lack basic skills necessary to succeed in community college***. The high school graduation rate in Santa Barbara County for Hispanic students is 70.8%, below 83.6% for all students in the district- of the ***Hispanics who do***

graduate from high schools in the SBCC service region; ***only <u>18.2%</u> meet the minimum requirements to apply to*** a four year university, far below other groups. Thus, the vast majority of SBCC Hispanic high school students **do not graduate university ready and therefore a** high number of Hispanic students enroll directly in the local community college. Among the 18.2% of Hispanic students eligible to apply directly to a California State University (CSU) or University of California (UC) students are **not acquiring university-ready skills** in the K-12 system and they **lack the academic preparation** to persist in college-level courses. For Hispanic students who enrolled in SBCC in Fall 2010, only 19% were eligible for college-level Math coursework compared to 27% for non-Hispanics. Eligibility for college-level reading courses is 15% for Hispanics versus 27% for non-Hispanics; in writing courses, 18% of Hispanic are eligible versus 31% of non-Hispanics. Supported by a grant through the *Lumina Foundation* for Education, research following one cohort of students for a full twelve years found that while less than one quarter of Latino postsecondary students graduate with a four-year degree within 10 years of leaving high school (less than half the rate of White students), the four-year degree persistence gap between Latino and White students was in large part a result of their lack of success in mathematics (The Educational Policy Institute's *Latino Students and the Educational Pipeline Part III: Pathways to the Bachelor's Degree*). Taking pre-calculus and calculus in high school positively increases Latino completion of the baccalaureate degree yet few Latino students take these critical courses before leaving high school. **<u>The number of students who are eligible for college level courses has decreased over the last four years in all core subject</u>**



areas of writing, reading and math-the ***lack of academic preparedness and the high rate of remediation for incoming students, is of great concern.*** One reason for the large number of Hispanic students now requiring remediation upon enrollment in SBCC, is the percent of high school students who are "at risk" based on results of the California Standards Tests (CST) developed for California public schools that assesses state-adopted content standards in grades 2-11.

Table 1 (below) indicates that 11th grade Hispanic high school students are *at-risk in all areas* tested. Many of these subject areas reflect **key gatekeeper** courses like *Algebra II* which is required of all CA high school students to be eligible to apply to a public 4-year institution. These ***disparities in academic preparation and college readiness*** present multiple barriers for Hispanic students, saddling them with *significant levels of remediation* in Math and English once enrolled in college which in turn will *limit direct access to degree pathways*, especially in STEM fields. **Stumbling Blocks to Hispanic Student Baccalaureate Degree Completion.** Santa Barbara City College proposes to develop a state-of-the-art baccalaureate pathway in targeted STEM programs to address the major obstacles that significantly impact Hispanic and low income **student enrollment, degree completion** and **transfer** in STEM fields. **Few Santa Barbara City Students Enroll in STEM Majors, including Math and Science**. Of the 6,365 Hispanic students enrolled in Fall 2010, only 434 (6.8%) declared majors in STEM fields compared to 9.5% for non-Hispanic students

Table 1- Percent of 11th Grade Hispanic Students in SBCC Feeder High Schools Meeting or Exceeding State Standards in 2007

Subject	DPHS	SMHS	SBHS	CHS
English/Language Arts	56	54	51	45
Algebra II	**4**	**0**	**14**	**8**
Biology/Life Sciences	56	80	46	21
Chemistry	56	62	51	20
Earth Science	N/A	7	N/A	64
Physics	87	5	48	65

Source: CA Standardized Testing and Reporting (STARS), CA Dept. of Ed., 2009.

and **9.4% for low income students**. **Completion of math requirements needed to transfer in a STEM major serves as the major barrier to students pursuing and achieving their degree/transfer objectives.** Fewer than **22%** of the students that entered the college in Fall 2007 with a major in a STEM discipline successfully completed the math sequence required to be accepted in a STEM major at UC or CSU campus within a four-year period; the success rates for Hispanic students **(16%) and for low income students (9%)** were significantly lower. In addition, there is limited capacity in science labs and STEM student study areas to meet existing and projected increased student need to complete their science general education and major field requirements. **Unclear Transfer Pathways and Articulation Agreements.** The *California transfer system is the most obstructed in the nation* according to many State and national reports. Transfer opportunities to the two public university systems, UC California and the CSU, have significantly diminished due to State of California budget problems, increased demand for access to limited spaces, and a complicated transfer system. The California higher education system promised broad access to community colleges (with the lowest tuition in the nation), and easy transfer to State universities where admission is guaranteed after two years on a transfer track at the "junior college." IGETC–-the California State System "Inter-segmental General Education Transfer Curriculum"—developed to promote seamless transfer, is instead a *major hindrance*. Mandated official articulation agreements between official State community colleges and universities do not identify how courses will fulfill university requirements. *Courses, expectations and assessments continue to be misaligned and confused.* A new obstacle to SBCC transfer is the change in CSU practice to now give priority to transfer admissions to students from community colleges in a CSU campuses service area, which for SBCC there is only one-CSU, Channel Islands, the systems newest and smallest campus located 70 plus miles from Santa

Barbara. Moreover, a recent change in UC System policy no longer allows campuses to give priority admissions to transfer students in their region -until two years ago was a long standing practice. The obstacles in serving transfer students are listed below.

Articulation Process	Lack of up-to-date course outlines, slow, inefficient approval process
Transfer to Four-Year Institutions	UC/CSU process (slow, inconsistent, inadequate), UC/CSU lack of major preparation information
Transfer to Independents/Privates	Independent colleges/private universities do not use same data management system as SBCC and are not willing to develop articulate agreements.

Transfer opportunities for California community colleges are further challenged by increased demand for access to limited spaces. Almost all UC and CSU campuses are moving to Fall only admission. Some ***CSU's and some UC's are considering suspending, severely limiting or raising the GPA threshold for Transfer Admission Agreements***. For example, CSU is planning to trim its total system-wide student enrollment by 40, 000 by 2012. By the end of 2010-11 academic years, CSU will have reduced approximately 20,000 students. As a result, academic *requirements for transfer will be even more stringent* than current requirements. The transfer problem is greater for SBCC than other CCCs (as seen in the table below).

- Total CCC transfers to CSU decreased by 9.1% (-5054 students) from 2007-08 to 2008-09
  - **SBCC transfers to CSU decreased by 16.6%** from 2007-08 to 2008-09
- Total CCC transfers to UC increased slightly (+1.4%) from 2006-07 to 2008-09
  - **SBCC transfers to UC decreased by 4.1%** from 2006-07 (n=582) to 2008-09 (n=544).

Very Few Santa Barbara City Students Transfer, Especially in STEM Fields. CPEC data shows the ***overall statewide completion rate*** for Hispanic student community college degree seekers ***at 18%; the transfer rate is even lower at 13%.*** At SBCC, 71.3% of Hispanic students who enroll state an "*intention to transfer*" to a 4-year university, yet ***80.5%*** **do not transfer**. The

total transfer enrollment from SBCC to UC & CSU universities in 2009-10 was 987 of which only 162 were Hispanic (16.4%). Of the **Hispanic and low income students that were actively pursuing a STEM major** at the college starting in Fall 2007, just **36%** completed the lower division transfer requirements needed to be accepted to a UC or CSU campus over a four-year period **versus 50% for all other student groups pursuing STEM majors.** According to the *American Association of Community Colleges*, "Hispanics are less likely to enroll directly in a four-year university; however, *most Hispanics will enroll in two-year Colleges*, more than any other group".[1] About 40% of Hispanic 18-24 year old college students attend 2-year institutions compared to 25% of white and black students in that age group". This is an important factor in that according to the *Lumina Foundation for Education, 2008*, **only 12% of Hispanics have completed four year of college**.[2] The ***number of Hispanic students who transfer from SBCC is far below the numbers of non-Hispanic students who complete a degree and/or transfer***.

Table 1A	Degree Completion Rate	Transfer Rate
Hispanic	14.7%	19.5%
Non-Hispanic	17.8%	47.9%
Overall	17.0%	41.0%

Table 1A shows data for a cohort of students entering SBCC in 2003-04 with a minimum of 12 units who ***attempted a degree, certificate or transfer*** within six years of entry. (N=2,242) (Source: 2010 ARCC Report detailed data). Overall student progress and achievement for the same cohort shows that the success of a proposed program depends on how well the college can prepare students for transfer, as seen in **Table 1B**, below.

[1] American Association of Community Colleges, 2008.
[2] http://www.luminafoundation.org, 2007.

Table 1B	Student Progress and Achievement Rate
Hispanic	40.8%
Non-Hispanic	68.9%
Overall	62.2%

Lack of adequate tracking for student progress precludes timely interventions

The college's student information systems and those used for institutional research do not have adequate data tracking for student progress through the STEM Curriculum Pathways or to monitor student progress toward completing the combination of courses that varies from university to university to transfer in their STEM majors. State and national accreditation bodies require colleges to collect data to track underrepresented student groups and their academic progress so that they may effectively address areas of weakness for program improvement. Without adequate tracking of student progress, Hispanic students' educational careers continue to be threatened. The challenge is to improve student success by increasing the quantity, quality, and timeliness of data that are available to students, instructors, and/or their advisers, and the quality of the analysis used to assess student risk, predict student success/failure, and/or improve tailoring of instruction to student needs, with the intent of improving the effectiveness and timeliness of interventions for at-risk or under-performing students. ***Without the capacity to adequately identify students who are at risk of not progressing, it is difficult to provide the appropriate intervention at the right time***. As a result, students who do not receive timely, accurate advisement/counseling may not meet the basic skills requirements for STEM pathways or may take classes that do not count toward their goal, which may delay their STEM degree completion or put them at risk for academic or progress probation. These risk factors ultimately increase the likelihood of dropping out and put students at further risk of losing financial aid eligibility, who take too many unnecessary units. **Summary of the Gaps or Weaknesses in**

Services, Infrastructure, and Opportunities to Be Addressed By the Project SBCC College has identified six major obstacles that significantly impact student progression and degree completion in STEM fields for non-traditional and underprepared students. The following significant problems will be addressed by the proposed STEM Transfer Program (STP). While the factors limiting enrollment and success in these programs are multiple and systemic, at the K-12- and college level, SBCC is committed to addressing each barrier. • **Success in High School** Hispanic and low income high school students underprepared in mathematics and science upon enrollment in college. Supplemental programs and support services are needed to increase the success of Hispanic high school students, with particular emphasis on math. Special summer intensives including *STEM 101* (modeled after MESA *Week Zero, and the California NanoSystems Institute SIMS program),* will provide a jump start for success for Hispanic students enrolling in SBCC in math prior to entry to SBCC and to four-year institutions. •**Enrollment in Advanced Mathematics in High School** Until Hispanic and other underrepresented students are well prepared in mathematics, not only will they not enter STEM programs and have little chance of attaining the baccalaureate degree in any major. The proposed STEM Curriculum Pathway will inform students which high school and Dual Enrollment courses are needed to prepare for and successfully complete degree and transfer objectives in a STEM field. • **Exposure and Interest in STEM Fields** Students at all levels need opportunities to observe and experience the many exceptional opportunities to work in current and emerging STEM occupations in Santa Barbara County and the region. The Engineering Academy at Dos Pueblos High School, the newly formed STEM Academy at Santa Barbara High School, the Agriculture Academy at Carpinteria High School, the Allied Health Academy at San Marcos High School, and a new Science curriculum at Bishop Diego High School will promote student

interest and preparation for STEM related fields. Hands-on project based learning, career exploration learning activities and an annual Science Night for parents and prospective STEM students will further generate interest in STEM fields.• **STEM Learning Communities** SBCC will expand and redesign its current Title V HSI *Express to Success Program*-an accelerated/ immersion model-creating a *STEM Transfer curriculum pathway* to prepare students to enter and succeed in pre-transfer level and transfer level courses in Math or English in one semester and to transition into the Science Transfer Program curriculum. The STEM learning communities provide opportunities for cohorts to stay together throughout their educational experience at Santa Barbara City to promote successful transfer to the universities. • **Consistent Common Performance Expectations** Lack of alignment of exit skills with entrance requirements for next course in sequence between high school/SBCC and university courses and sequences is a major cause of student failure. This lack of alignment is an unnecessary obstacle. Greater collaboration for real articulation is necessary for both general education requirements and STEM program-specific requirements in order to create a seamless, fully articulated model with four-year colleges. New articulation agreements will be created in STEM majors to include specific lower-division courses and performance criteria in the STEM fields offered at private and out-of-state universities, particularly HSI institutions. • **STEM Course and Career Counseling** Santa Barbara City students can slip through the cracks because advising and counseling are not specific to Hispanic students, STEM courses, or majors. Advising and career counseling infused into academic programs at the course-specific level is needed, as well as a means of monitoring academic progress on the student's educational plan efficiently and in a timely manner, through electronic portfolios. Counseling, academic and support services, tutoring, directed learning activities and supplemental instruction will be integrated into the STP Learning Communities.

Parent and student workshops and counseling in financial literacy, financial aid and scholarship opportunities, and the use and application of undergraduate research opportunities will be incorporated into a new *Sciences 101* course and in the college success course. A STEM student tracking system will monitor student progress in completing the courses. Individual educational plans based on the STEM Pathway Curriculum Guides will enable counselors STP staff and faculty to identify and provide appropriate intervention strategies in a timely manner. • **Hands-on State-of-the-Art Learning** To accommodate the expected increase in the number of students majoring in a STEM field and to establish and maintain the integrity of the STEM learning communities, *four additional science lab sections will be created* and offered each semester, a *STEM Study Center* will be established with faculty and peer tutorial support specifically for STEM cohorts, and the *Chemistry and Computer Science Labs will be upgraded* with new high-tech equipment to further facilitate hands-on state-of-the-art learning.

2. QUALITY OF THE PROJECT DESIGN

a. The following goals and objectives address identified problems in the SBCC STEM pipeline:

Key Goal 1 *To establish early readiness and awareness approach for STEM degrees with emphasis on math and science-consistent with national best practices with Hispanic and other underrepresented students, to increase the number of qualified Hispanic and low income students who seek STEM program fields and to increase the number of qualified Hispanic professionals in these fields.*

- **Related Academic Program Goal**: To develop improved/more effective outreach to Hispanic families, students, and community to increase access to higher education STEM programs for Hispanic and other low income students.

- **Related Academic Program Goal**: To provide information on financial aid, transfer requirements and academic services to K-12 to promote early readiness and clarify expectations for STEM baccalaureate pathway academic requirements.

Key Goal 2 *To establish an accessible, seamless STEM course and transfer pathway effective with Hispanic and other underrepresented, at-risk students from SBCC, to degree completion in the following STEM disciplines: biology, chemistry, earth and planetary sciences, geology, computer science, engineering and mathematics.* **(*Absolute Priority #1 and #2*)**

- **Related Academic Program Goal**: To establish a dual enrollment STEM option for seamless transition from high school to college and remove all other identified institutional obstacles on existing transfer pathway for STEM degree completion from SBCC through CSUCI and UCSB.
- **Related Academic Program Goal**: To align all pathway courses and increase course progression/degree completion, in both general education and STEM program–specific courses to promote student success.
- **Related Academic Program Goal**: To establish STEM academic and counseling support to increase success, retention and transfer rates of Hispanic students in targeted academic pathways.

Key Goal 3 *To establish assessment systems and capabilities needed to collect , analyze, and use high-quality and timely data on STEM program participant outcomes (in accordance with privacy requirements) to improve postsecondary student outcomes relating to enrollment, persistence, and completion and leading to career success.* (***Competitive Preference Priority***)

- **Related Improvement Goal:** Establish an inclusive, collaborative assessment and student tracking process for students enrolled in STEM programs to improve transition rates of Hispanic and other underrepresented students into STEM degree and transfer programs.
- **Related Improvement Goal**: To develop a baccalaureate pathway tracking system which provides information to inform planning for other initiatives to further improve outcomes and make them more equitable for Hispanic students.

- **Related Improvement Goal:** To reduce the federal cost for undergraduate degree attainment in STEM degree and articulated programs.

KEY MEASUREABLE OBJECTIVES/PERFORMANCE OUTCOMES:

1. To establish a dual enrollment option for seamless transition and remove identified institutional obstacles on existing transfer pathway for degree completion in STEM fields from high school to SBCC.
2. To increase the number of full-time degree-seeking Hispanic and low income undergraduates who are formally enrolled in a fully articulated STEM curriculum by 484 students (25% increases over the Fall 2010 base line of 387) with an approved plan to complete degree/credential on schedule (within 6 years of enrolling at SBCC, the national benchmark for Hispanic students) by 2016. (***Absolute Priority #1***)
3. To increase the STEM degree completion rate for Hispanic and other low income students by a minimum of 100% over the 2010 baseline from 60 to 120 by 2014. (***Absolute Priority #2***)
4. To increase the number of Hispanic and other low-income students who complete STEM articulated transfer curriculum pathway on schedule over Fall 2010 baseline data (within 2 years of enrolling in college-level courses by Fall 2010, or on schedule mapped out in their baccalaureate pathway educational plan) from 39 to a minimum of 78, a 100% increase.
5. By Fall 2010, increase the percentage of Hispanic and other low-income students with STEM majors who transfer to a four-year university within a four year period to 36% (a 20% increase over Fall 2010 baseline of 30%). (***Absolute Priority #2***)
6. To reduce the federal cost for undergraduate degree attainment in STEM degree and articulated programs by 70%, from $29,426,285 to $8,827,886 by fall 2016.

b. Project Design to Address the Success of Hispanic Students in STEM Programs:

According to Davis Jenkins, Senior Research Associate of the Community College Research Center at Teachers College, Colombia University recently noted that while community colleges have been researching and investing in building upon best practices, successful program completion rates remain disappointing. "At every stage of the student's experience with college ---connection, entry, progress and completion---community college practices are often not well designed and aligned with one another to facilitate entry into and completion of a program of study as soon as possible." Jenkins challenges community colleges to 'implement a "best process" approach rather than a "best practices" approach' (Jenkins, 2011). That is precisely the intent of the SBCC STEM Transfer Program (STP). The STP presents a coordinated and integrated plan to increase the capacity of SBCC to meet the following performance outcomes: (1) increase the number of full-time degree-seeking Hispanic and low income undergraduates enrolled in STEM programs; (2) improve progression/ bridging/transition from basic skills to college-level STEM programs; (3) increase student success rates of Hispanic students enrolled in STEM; (4) strengthen articulation strategies and improve advising to increase achievement of student goal attainment, degree and transfer rates in STEM; (5) provide accurate and easily accessible student information to enable timely interventions; and (6) increase fiscal stability to reduce federal cost of degree attainment in STEM programs.

<u>Component One</u>: ***Assist students to progress from Basic Skills to STEM courses for degree completion and transfer.***

- Development of streamlined progression pathways (ESP-STEM Learning Communities, accelerated Basic Skills courses), Electronic Ed Plans, E-Portfolios, Directed Learning Activities), Online Technology Self-Assessment (linked to appropriate level STEM LC)
- Strengthened articulation strategies-STEM Dual Enrollment with regional high schools, U.Direct articulation data from ASSIST, STEM Transfer Effectiveness Plan, Transfer-Make it Happen

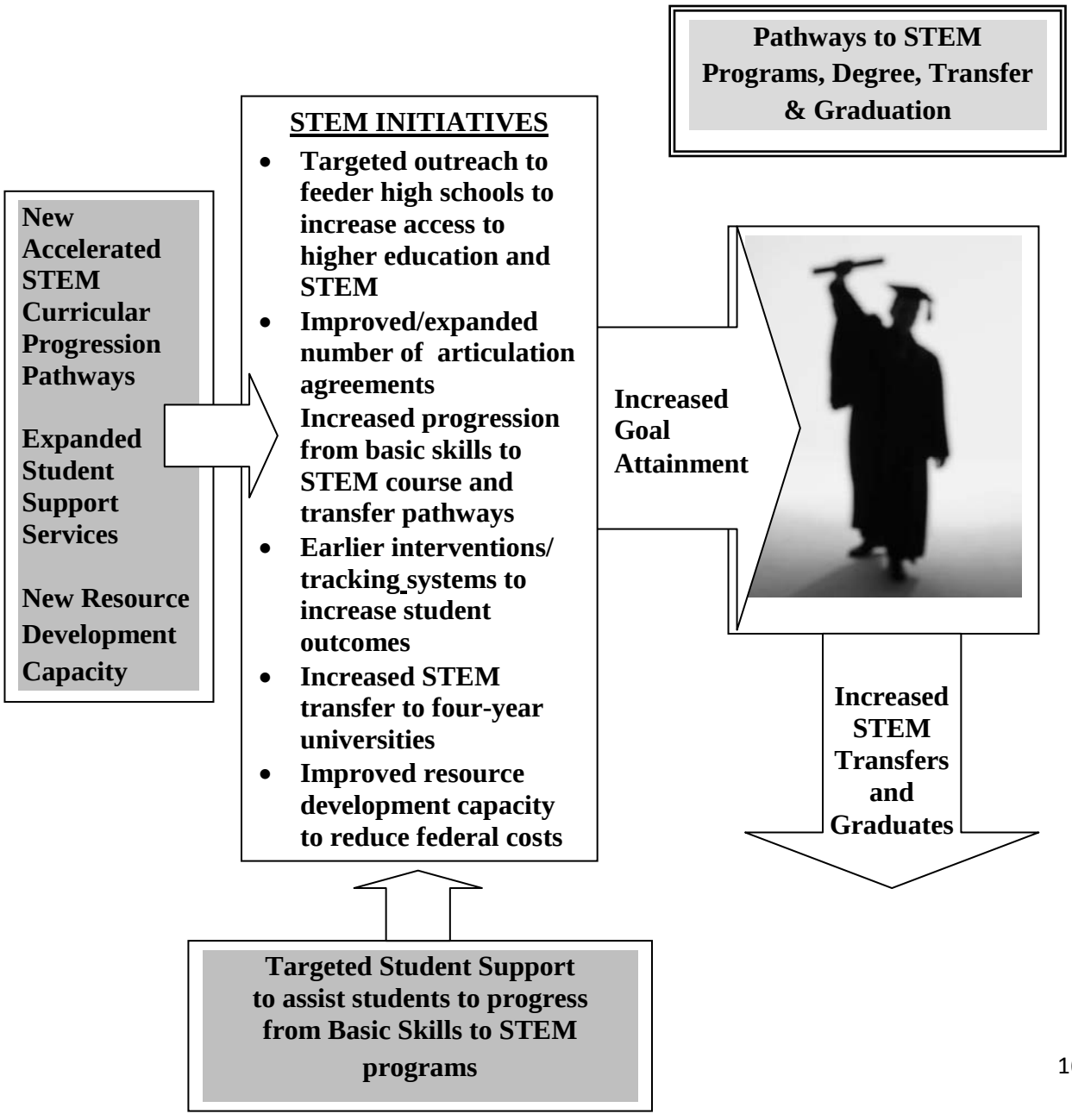
Component 2: ***Develop strategies to strengthen academic and support services.***

- Expand and develop targeted student support strategies including Supplemental Instruction, Financial Aid and Technology Literacy LCs, Outreach, Tutoring, STEM Study Center, STEM Student Pathways Tracking System (SPTS) System and assessment capacity, web-based STEM orientation, Early Alert, Electronic Ed Plan
- Train faculty in technology and STEM LC curriculum design for Learning Communities

Component 3: ***Strengthen fiscal stability to reduce federal cost for underrepresented students***

- Strengthen resource development capacity for external funds development

Intended Outcomes of the Activity Strategies and Impact on INCREASED STEM COURSE COMPLETION, DEGREE AND/OR TRANSFER



3. QUALITY OF PROJECT SERVICES

a. The following highlights the most important services/activities of the SBCC STEM Transfer Project:

Component One: *Assist students in progressing FROM Basic Skills TO college-level STEM courses TO STEM degree completion and transfer.*

OVERVIEW OF STRATEGIES TARGETING DEGREE AND TRANSFER STUDENTS	
Strategies to help Hispanic students progress from basic-skills to college level STEM degree/transfer courses:	**Strengthened Articulation strategies**-Expand high school dual enrollment programs to include new STEM program. Implement U.Direct to track articulation data from ASSIST; develop a STEM Curriculum Pathways Plan, and a Transfer-Make it Happen outreach plan. Increase number of articulation agreements with private and out-of-state universities to expand access to transfer opportunities in STEM. **Structured STEM Learning Communities**: Placement in STEM-LC based on assessment results and individual educational plans; financial/technical literacy courses and Directed Learning connected to tutoring, supplemental instruction and timely focused interventions; academic and career counseling/planning, student services and co-curricular leadership opportunities. All activities support course completion. **Academic Progression:** Counselors use electronic education-plans to track student progression at key intervals in two-track STEM Curriculum Pathways (AA/AS STEM degree completion, AA/AS to transfer); faculty trained in effective methods to increase learning and success rates for under prepared and at risk students, e-portfolios, instructional technology/digital media, student assessment and interventions.

Strengthened Articulation Strategies

Success in High School (Academic Preparedness) Each of the high schools in the Santa Barbara community have or are close to implementing *STEM academies and programs* to promote student interest and preparation for STEM related fields. These include the Engineering Academy at Dos Pueblos High School, the newly formed Green Academy and STEM Academy at Santa Barbara High School, the Agriculture Academy at Carpinteria High School, the Allied Health Academy at San Marcos High School, and a new Science curriculum at Bishop Diego High School. Each of these programs include a priority to serve under-represented students, *dual*

enrollment courses in math and/or sciences and hands-on project based learning and career exploration learning activities. With close to 500 students per year taking part in these programs each year, it is expected that the number of Hispanic students interested and prepared to pursue STEM majors and careers, will increase. Students who begin on a STEM pathway in high school will be more likely to enroll in and complete their associate degree and transfer degrees in a STEM major field. Students will be encouraged to participate in *Early Assessment* the summers of their Junior-to-Senior and Senior-to-SBCC years to assess math and language skills. Based on scores, supplemental academic support will be provided the summer prior to college enrollment.

***Exposure and Interest in STEM Fields*:** Three levels of *STEM ambassadors* will visit high schools to introduce the STP: faculty ambassadors in STEM majors; current students and career ambassadors, young workers in STEM professions. *Science Nights*: Parents of students and prospective students from feeder high schools come to SBCC College to learn about programs and services. Information is given in both Spanish and English by campus representatives and will include video of Hispanic role models and stories of success; STEM presentations by SBCC students and faculty; industry presentations on careers and current employment possibilities.

***Transition from Outreach to Enrollment in STEM Transfer Program -STEM 101*:** modeled after Bakersfield College's MESA *Week Zero, and the California NanoSystems Institute Summer Institute in Mathematics and Science (SIMS) program.* The SBCC three-day intensive program, will be offered the week before fall and winter semesters, and is designed to involve students in project-based activities in college math and science disciplines, college success skills and career exploration in a fun, cohort building curriculum. Counselors and teachers from the Carpinteria and Santa Barbara High School Districts will recommend Hispanic and low-income students for the summer program; the winter program will accommodate currently registered students

interested in STEM fields. Students will be encouraged to take part in the college's STP. Activities include power math presentations; math preparation; science experiments, projects and competitions and introduction to science labs; STEM Counselors provide study skill and career exploration workshops; SBCC student mentors/tutors connect with individual students for follow-up during the semester. *Early Decision*. During the spring term students from feeder high schools come to the SBCC campus and take math, reading and English placement exams and receive orientation and counseling. New Early Decision identifies STEM possibility and participation in the STP on the education plan and refers students directly to SBCC STEM programs. Students are connected immediately with mentors and SBCC STEM counselors.

Structured Curriculum Pathways will be developed for students entering the college prepared for transfer -level English and math courses and who will complete each term to finish their degree and/or transfer requirements in two years. for students requiring remediation in basic skills prior to enrollment in transfer-level required STEM courses, students will complete each term to complete their degree within no more than three years. Courses and academic and student services activities will be prescribed for each STEM major student.

<u>Structured STEM-Science Transfer Program</u> (STP)

Will identify prospective STEM students who need remediation in reading, writing and/or math as evidenced by their course level placements (scores based on validated multiple measures) on the assessment instruments used by the College and by contacting continuing students enrolled in basic skills courses. These students will be eligible to enroll in the expanded Express to Success (ESP) program-the new STP, comprised of 14-16 unit learning communities designed to enable students to complete their pre-college transfer level courses in reading, writing and math in one or two semesters. The LCs will be contextualized to prepare students with the competencies

needed to succeed in STEM courses and to engage students in course assignments and academic and career exploration and career planning activities designed to increase student interest in and preparation needed to enter and succeed in completing degree/transfer objectives in STEM majors. The high number of units is based on the extensive research that shows that the fewer semester students are enrolled, the more credits earned, and higher GPA at community colleges; the more likely they were to obtain a degree or transfer. Student scores on the college's reading, writing and math assessment tests will be used by ESP counselors to determine which of the LCs students need to complete and the sequence in which the LCs should be taken. Therefore, the number of learning communities students will need to take could range from one to three, depending on their initial basic skills levels. Students in need of remediation in both math and English will be placed in the appropriate level math LC(s) prior to enrolling in the appropriate level English LC. Following are descriptions of the five Basic Skills Accelerated Learning Communities. These LCs have or are in the process of being developed as part of the college's Title V grant to develop its Express to Success Program to enable students to complete their basic skills needed to succeed in the transfer English and math courses in an accelerated format. Designated sections of these LCs will be customized for students pursing STEM majors.

Accelerated Learning Communities		
	Description	**Total Units**
ESP Math LC 1	Math 100 (5 units0, and Math 107 (4 units), Personal Development 100: College Success (3 unit transferable course) Math 100N (1 unit math study skills class), and a Computer Applications course corresponding to the technology and digital media literacy skills needed by students to succeed in their courses and in the work place (1 unit)	14
ESP Math LC 2	Math 107 (4 units), Math 120, College Algebra (4 units), Math 107N (a 1 unit math study skills class), a pre-college level English course (4.5 units) that is aligned to the remediation needs of the student, either the Personal Development 100 College Success course (3 units) or the Personal Development Career Exploration and Planning course (1 unit, (Course	14-16

	selection depends on if this is the first or second semester the student is enrolled in the Express to Success Program), and a Computer Applications course (1 unit) that corresponds to the technology and digital media literacy skills needed by the student	
ESP **English LC 1**	English 70, two levels below college-level reading (4.5 units), English 80, two levels below college level writing (4.5 units), a course that meets a college and transfer institution (University of California and California State University) General Education requirement (3 units), the appropriate level of a Computer Applications course that corresponds to the technology and digital media literacy skills needed by the student (1 unit), and a Personal Development course on Career Exploration and Planning (1 unit):	14
English LC 2	English 80 (4.5 units), English 100, one level below college-level English (4.5 units), a course that meets a college and transfer institution General Education requirement (3 units), a Personal Development course in Career Exploration and Planning (1 unit), a Personal Development course in Educational Planning (1 unit), and a Computer Applications course that corresponds to technology and digital media literacy skills needed by students (1 unit):	15
English LC 3	English 100 (4.5 units) and, depending on their placement levels, a combination of either Math 100 (4 units), Math 107 (4 units) and Math 100N (1 unit math study skills class) or Math 107 (4 units), Math 120, college algebra (4 units), and Math 107N (1 unit math study skills class), a course that meets a college and transfer institution General Education requirement (3 units), Personal Development 100 (a 3 unit transferable College Success course), and a Computer Applications course that corresponds to the technology and digital media literacy skills needed by student (1 unit):	16

STP LEARNING COMMUNITIES
STP Learning Communities will be developed to enable students to complete STEM degree and transfer requirements in a sequence corresponding to the student's progress. STP Learning Communities will include the General Education courses students need to complete STEM degrees and transfer requirements, transfer level English and Math courses, computer applications, and supplemental instruction.

Academic Progression

Assessment-All high school juniors take the SBCC Assessment Tests in English and Math and counselors use this data to guide student schedule development and college plans. Funding from this grant will help develop the STEM Curriculum Pathways that will be used in the high schools

to inform students which high school and Dual Enrollment courses they need to take to prepare for and successfully complete their college degree and transfer objectives in a STEM field. By the second year of this grant (2012-13) all area public high school 9th grade students will explore careers through the existing Dual Enrollment Freshman Transition Initiative in which they develop a ten-year plan. ***Technology and Digital Media Literacy Skills*** needed to succeed in college and in the work place will be taught in the Computer Applications course linked to each STEM learning community and reinforced by in the assignments in each of the learning community courses. Content will include key boarding, software applications; Internet research strategies; using Moodle, the college's web-based learning management system. Students will be assigned by the STP counselor to the appropriate level courses based on the students' Technology Literacy Assessment. ***Student Tracking System-*** will enable the college to monitor and offer customized interventions and follow-up services to students at each critical point on the defined pathway to their educational goals; integrates U Alert (the college's recently acquired electronic educational plan software), TreQ, ASSIST, TES, SARS-ALRT, Student Pathways Tracking, and Banner to provide framework for increased student engagement, increased awareness of and interaction with student support services, and increased student success. The use of an ***Electronic Education Plan and System Integration (funded by the SBCC existing Title V HSI grant***) will help students select the right courses to reach their academic goals and understand course requirements needed to meet lower division requirements to transfer to a four-year university in a STEM field of study. To address this problem, SBCC will integrate its recently acquired electronic educational plan system (Ualert) with its Banner Student Information System, the STEM Curriculum Pathways, and transfer articulation agreements to allow advisors and students to build course plans to ensure they fulfill the transfer or degree

requirements. Systems will be integrated with Student Services, contributing significantly to student engagement and success.

Software Systems to be integrated for Student Services

STEM Student Tracking System	Build	Monitors STEM student progress; identifies intervention points; provides communications and feedback
Argos	Existing	Report creation and delivery system.
Banner	Existing	Student Information System
SARS ALRT	Existing	Early Alert System
SARS GRID	Existing	Student Counseling Appointment Request Tracking System
ASSIST	Existing	Web-based course articulation database used by advisors and students to plan courses for the desired major and target transfer institution(s).
Decision Support System	Existing	Proposed Data Warehouse/Reporting system (created under with current Title V HSI grant)
U.Direct	Existing	Electronic Education Plan software. Purchased under existing Title V HSI grant.

Strengthened Articulation Strategies Will expand and improve agreements with four year in-state and out-of-state public and private universities to increase transfer opportunities significantly diminished due to State of CA budget problems, increased demand for access to limited spaces, increased GPA requirements, especially in STEM majors, and frequent and unanimated changes in transfer institution admissions requirements (e.g., G.P.As., lower division course requirements) that make transfer more difficult. ***Alternative transfer opportunities with in -state independent colleges and out of state private and public universities in general and in STEM majors in particular are needed***. Articulation is the cornerstone of transfer from a community college to four-year institutions. To ensure students take the appropriate courses to facilitate transfer, minimize time to degree and successfully progress to the four-year institution, SBCC will expand the number of institution, course-to-course and program articulation agreements with HSI four-year institutions that have effective degree completion rates for

Hispanic and under resented students. Activities will create a seamless transfer articulation pathway that places more focus on preparation for advanced course work, practice in key learning skills (Self Directed Learning Activities, E-Portfolios), and support services.

Articulation Workshops. Opportunities to engage in leadership and professional opportunities related to students STEM major field(s) of interest (e.g., co-curricular organizations; research projects, internships, summer science institutes/programs) available at the college and/or co-sponsored by SBCC and transfer institutions. SBCC faculty and the Curriculum Articulation/ Transfer Specialist work with UCSB, CSUCI, and other four-year university faculty in several one-day, intensive workshops for course articulation. Focus is on student learning outcomes, course and program alignment, and facilitating student interest and preparation to apply for and be accepted to continue their education at a university in their STEM major field of interest.

<u>Component 2</u>: ***Develop strategies to strengthen academic and support services***

OVERVIEW OF STRATEGIES TARGETING DEGREE AND TRANSFER STUDENTS	
Strategies to strengthen academic and support services	**Improved Student Pathways**: to monitor and offer customized interventions; STEM Transfer Program; Supplemental Instruction (SI) for accelerated ESP Basic Skill LCs (contextualized for STEM majors); transition from the basic Skills LCs to the STPLCs, STEM Curriculum Pathways; degree audit; mentors, tutoring, on-line SEPs, web-based student services, Directed Learning Activities (DLA), student tracking, Ed Plans **Intensive Orientation/Counseling:** Web-based orientation; Spanish outreach to families and K-12 students; financial aid workshops for incoming students/parents; financial and technology literacy PD courses; Gateway tutoring; STEM Curriculum Pathways, STP LCs with integrated/linked student individual Electronic Educational plans, counseling, academic and career planning, tutoring. **Faculty Development Workshops:** Faculty training in instructional technology and LC curriculum design for STP LCs and contextualized ESP accelerated Basic Skills Learning Communities, development of joint activities with transfer institutions, development/expansion of research and other professional activities for STP students.

Improved Student Pathways- includes intervening and following-up with cohorts of students at critical points of progression towards goal attainment, from orientation and assessment to exploration, planning, monitoring progress, to successful degree and/or transfer completion, transition into STEM careers or majors at transfer four –year institutions. This program builds on the model and infrastructure to support it that has been developed and successfully field tested as part of the college's Title V supported Express to Success Program. This program was designed to prepare students in need of basic skills to enter the transfer English and math transfer courses in an accelerated format. The proposed STP is designed to increase Hispanic student degree and transfer completion rates in STEM disciplines in 2 to 3 years, depending on their level of skills upon entering the program. This STP grant project will proactively engage students in general and Hispanic students in particular in activities to increase their interest pursuing a STEM major and career, provide them with the skills, competencies and support needed to successfully complete their degree and transfer STEM major requirements (especially in mathematics) in two to three years, and successfully transition into STEM majors at four-year transfer institutions. Clearly articulated STEM Curriculum Pathways will be defined and used to develop the STP LCs for cohorts of students in the STEM STP. In each pathway, needed support services are defined not only in relation to the student's stated educational and career goal but also by the student's progression toward that stated goal. At certain junctures during the educational cycle, students need different types of support and advice. Within this pathway model, specific expectations for progress will include curricular (e.g., appropriate course choices and course sequencing) and co-curricular involvement (e.g. ,use of academic and student support services, completion of DLAs, internships and work experience. Student progress along a pathway will be monitored and students will be given regular feedback and direction at key intervals (15 units, 30

units, 45 units, 60+ units). Readiness assessment will include readiness in reading, writing and math. ***Financial Planning/Financial Literacy*** modules will be embedded in each college success course that is part of the first learning community the students take toward completing their STEM degree/transfer requirements. Students will develop a personal financial plan in the first LC in which they enroll. Courses in each of the STP LCs will be linked with one another to reinforce the competencies and experiences students need to succeed in completing their STEM major degree/transfer requirements. The LCs will contain courses students need to fulfill lower division general education requirements and major field transfer requirements for students in STEM disciplines. Faculty teaching non-science general education courses (e.g., transfer level English, math, psychology, art appreciation) courses, the college success and computer applications courses that are part of the STP LCs will incorporate assignments into their classes to draw connections between the skills students are learning in their courses and those needed to succeed in science classes in STEM majors. The use of themes will be determined by the STEM STP Leadership Team and the STP LC faculty during each year of the project. ***Supplemental Instruction (SI):*** The Gateway to Success tutorial Program, selected by the 2008 Two-Year College Association (TYCA) Awards for Outstanding Programs in English for Two-Year Colleges and Teachers, is a faculty driven initiative developed to help students achieve success in their first years of college. Tutors will provide SI *in each of the general education and major field courses that are part of an STP LC*. Successful course completion rates and college persistence rates of students enrolled in basic skills and introductory college courses with Gateway SI tutors have been significantly higher than sections of the same courses that did not have a Gateway tutor (*SBCC Office of IR, 2009*). ***DLAs*** will further support course work to include assignments students are expected to complete in each of the classes that are part of the

STP LCs. Students in the STEM STP program will be required to complete the transferable College Success course which includes instruction in time management, study skills, communication skills, goal setting, career and academic planning aligned with educational plans to complete STEM degree and transfer requirements, and personal financial planning. ***Tutoring, Mentoring***. On-line tutoring will be provided by university students via web-cam in the SBCC STEM Success Center. Students will visit university campuses and use university labs in connection with SBCC coursework. SBCC students are connected with CSUCI/UCSB students through Transfer Coaches and attend structured, new orientations for transfers at university. ***Hands-on State-of-the-Art Learning (Directed Learning)*** The **STEM Success Center** will be initially be located in the Transfer Center (adjacent to the current MESA Program Center), and it will move into its own separate facility by the third year of this project. A temporary classroom building will be renovated in year 2-3 following the completion of a newly renovated Humanities building. Currently the classroom building is needed to relocate class rooms displaced during the remodel. The STEM Center will serve as a dedicated STEM technology lab equipped with the latest communication tools and will serve as hub for the STEM project. Conference rooms with video conferencing capabilities will enable synchronous on-line tutoring, supplemental instruction and video conferencing. The facility will host online workshops (students-to-STEM professionals, faculty-to-faculty, faculty-to-professionals, UCSB and CSUCI students-to-SBCC students) and web-cam tutoring provided by CSUCI and UCSB students. The STEM Center will feature STEM counselors and CSUCI/UCSB Success/Transfer Coaches and serve as a center for field-trips and STEM 101. Study groups will convene here in the evenings to accommodate working students with expanded hours in labs and student support service availability. Existing Chemistry and Math labs will also be renovated to increase lab capacity and will include

equipping 6 additional labs with high tech supplies and equipment as referenced above. *Internships/ Field Experience and Research Opportunities*- Students will be informed of summer research internship programs such as UCSB's Internships in Nanosystems Science, Engineering and Technology (INSET) Summer Research Program and Strengthquest and will be assisted with application to increase acceptances and placement in internships. They will be informed of similar types of opportunities available at CSU, Channel Islands and other transfer institutions the college has or will be developing articulation agreements in STEM majors. To facilitate additional industry-based learning, students will be informed of professional conferences and will be encouraged to participate in student clubs such as: Student Leaders in Science, SACNAS. Bio Club, Geo Club, S.H.P.E, Math Club, Computer Science Club, Women in Science and Engineering (WISE) and the Environmental Awareness Club. ***Scientific Lab Improvement-*** Tablet computers and high resolution projectors for Chemistry labs will enhance interactive and project-based learning environments in small groups in the classroom. Mini-gas chromatography stations and a bench-top atomic force microscope will provide hands-on laboratory project experience and a greater understanding of scientific concepts through visualization of otherwise abstract atomic structures. To accommodate the expected increase in the number of students majoring in a STEM field, STEM funds are being requested to equip four additional science lab sections so they can be offered each semester.

Orientation/STEM Course and Transfer Counseling Remove barriers to transfer through *STEM Transfer counselors* who will connect students with college mentors and tutors while at SBCC; assist with dual enrollment, summer research opportunities and summer bridge programs such as INSET at UCSB. *Web-based orientation in STEM* will be provided via the SBCC website to all incoming students. *Spanish outreach* to families and K-12 students; *financial aid*

workshops for incoming students/parents; *financial and technology literacy PD courses*; *Gateway tutoring*; and *Electronic Ed plan* will be provided to all STEM student cohorts

A *STEM Student Tracking System* is designed to address three goals:

1. to more accurately identify STEM students using course-taking behavior rather than the traditional "declared major" data element
2. to monitor the progress of STEM students towards completing their educational plans
3. to provide feedback to counselors, faculty, and STP staff by identifying key "intervention points" to guide students towards staying on the best path towards their goal.

Identifying STEM students using their declared major is inadequate. The proposed STP will use the 3-course heuristic to identify candidates for STEM majors and will use historical data to refine it as needed (i.e. match courses with predicted goal, versus actual outcome). The Institutional Research and Assessment Office will create a taxonomy of course templates specific to each STEM major. Monitoring the Progress of STEM majors will be done by tracking the course-taking behavior and comparing it against the templates of required and recommended STEM courses that make up the STEM Pathway Curriculum Guides. Data can be "mined" utilizing the Banner Student Information System and related course and degree audit systems (DARS, U.Direct, etc.) to compare actual courses taken versus the prescribed path as described in earlier sections. Providing feedback to students, counselors, faculty, and STP staff is essential. Intervention points" can be identified as:

- a potential STEM student (identified through high school courses or interests, or through current course-taking behavior) who has not declared a STEM major within the first year
- a STEM student accumulating units but not having successfully completed the gatekeeper courses identified for their particular pathway

- a STEM student who has not identified any target transfer institutions. . SBCC will provide a method for students to interactively choose and prioritize 3 or more desired transfer destinations; identifying one or more transfer destinations further refines the course-taking pathway the student needs to follow since transfer requirements vary considerably across institutions, even within the same major.

When a student reaches one of these intervention points, the system would notify the student and the appropriate staff (a counselor, appropriate STEM faculty member, etc.) via email or whatever communication mode the student has opted in to (including text messages), encouraging students to create an Ed Plan in the soon-to-be-installed Electronic Ed Plan system "U.Direct".

Faculty Development Workshops: Faculty training in instructional technology and STEM-LC curriculum design for accelerated STEM Learning Communities and credit. The new Faculty Learning Institute (Fall 08) features faculty exchanges, workshops, conferences, updates on instructional strategies and technology. Immediate focus will be integrating instructional practices with technology to improve STEM learning outcomes and strategies for teaching under-represented students.

Component 3: ***Strengthen fiscal stability to better serve underrepresented students.***

To help reduce the federal cost for undergraduate degree attainment in STEM degree and articulated programs, Santa Barbara City College will strengthen its external resource development capacity through broad-based training and exposure to policies, cycles, and application regulations of funding agencies that target HSIs and Hispanic students. Strategies proposed for development of internal expertise on HSI funding from federal agencies, corporation, and private foundation include gathering funding guidelines, researching model projects, visiting funding agencies, training opportunities and technical assistance workshops,

acquiring support staff and grant research supplies/subscriptions. ***Santa Barbara City College is not asking the Title V program to provide funding to write grants or prepare applications; rather, it is asking for staffing assistance and training to increase the institution's capabilities to compete successfully for HSI and funds that target Hispanic populations, schools, and communities.*** The college will hire a contractual Resource Development Specialist (RDS) to establish critical networks with groups such as the Hispanic Association of Colleges and Universities (HACU), and the American Association of Grants Professionals (AAGP). Each year, the Specialist will attend and present best practices of the college at the **CRD National Conference**-- the highest profile event in the realm of community college resource development, and will participate in the **Federal Funding Task Force** in Washington, DC to being to understand funding resources and how to build capacity. In Years 2-3, the focus will be on *training and research* attending technical workshops and bidder's conferences relevant to new programming and funding for Hispanic students. In Years 4 and 5, emphasis will be to link funding to research and planning, and to *institutionalize Resource Development capacity.*

b. Best Practices Infused in STP Project Design, Supported by Research

Planning and Research Process for this Activity*:* The Santa Barbara City College STEM Planning Team was responsible for 1) selecting, designing and sequencing activities and topics for this proposal; 2) contacting peer institutions for information on successful program development and curriculum design; 3) reviewing best practices literature and models; and 4) interviewing program directors from similar colleges regarding successes and challenges in the development and operation of their programs. The SBCC Planning Team did extensive research on the works of Skip Downing and Vincent Tinto who influenced the First Year Experiences, Academic Advising, accelerated basic skill courses and their integration into Learning

Communities, bridge courses, Supplemental Instruction, Early Warning and Intervention Systems and Campus Climate/Supportive Learner Environment and research studies on best practices and best processes for increasing degree and transfer completion rates for students that enter community colleges in need of basic skills and for those that are prepared to enter transfer English and math courses.[3] Review of these approaches, and those in place or field tested at the college (e.g., Gateway tutoring model, accelerated basic skills English and math courses, the importance of students committing to a major by the end of their first year in college, highly structured curriculum pathways to complete degree/transfer requirements in the most effective and least time as possible, integration of academic and career planning, academic and support services into courses, effective use of tutoring and supplemental instruction, intrusive counseling and assistance, cohort model, increasingly indicated that strong and timely student support services and academic support are necessary to increase the progression and goal attainment of all students, especially important to Hispanic students. A review of *Paths to Persistence: an Analysis of Research on Program Effectiveness at Community Colleges*[4] examined the effectiveness of specific practices in increasing persistence and completion at community colleges. A recent study of *Achieving the Dream Community College Strategies* described successful outcomes from the use of First Year Experience programs (orientation and advising, learning communities) student support services, and tutoring and Supplemental Instruction strategies. These strategies dramatically improved student retention and persistence rates. Other research showed that courses with a strong consistency between exit and entrance standards have higher rates of

[3] Bridges to student success : exemplary programs, 2003 / National Association of Student Personnel Administrators and National Council on Student Development
[4] http://www.achievingthedream.org/Campusstrategies/Promisingpractices

persistence through goal completion than of those that did not.[5] ***This in depth research and analysis helped the SBCC STEM Planning Team reach consensus and select the strategies and approaches for the activities presented in this proposal.***

Accelerated STEM Learning Communities The Lumina Foundation's research has consistently recommended traditional learning communities to HSIs because of evidence that they increase academic performance and persistence; 'helping Hispanic students bond to broader social communities of the college and engage more fully in academic life'; and add an intellectual richness to experience. These success strategies are consistently noted in research, such as in "Underachievement among Gifted Minority Students: Problems and Promises" ERIC Digest E544. *Accelerated STEM LCs,* incorporates best practices and lessons learned from: (1) other community colleges (e.g., Cabrillo College's Digital Bridge Academy, accelerated degree/transfer program in place at Community Colleges in the CUNY system, SBCC's Title V grant-funded Accelerated Learning ESL Immersion program, Citrus College Title V STEM Learning Communities grant, Chaffey College's Directed Learning Activities and Student Success Centers; colleges in the Washington State Community College System's extensive experiences in using learning communities; own experience with accelerated basic skills courses; (2) research literature (e.g., improving remediation is the single most important variable community colleges can do to increase the number of students who graduate with a certificate or a degree; the less time it takes to complete basic skills courses the more likely students will complete a certificate, degree and/or transfer; tightly structured blending of credit courses enhanced with academic support; flexible and personalized programs to address specific skill gaps to ensure students learn what they need; importance of active learning, student engagement,

[5] Boylan, Hunter. What Works: Researched Best Practices in Developmental Education. Appalachian State University, Boone, NC (2000) pg. 90

need for frequent feedback linked to targeted interventions; and faculty commitment to working with students in need of remediation); (3) a combination of the research literature, SBCC's experiences and the experience of those at some other community colleges (e.g., De Anza College, El Camino College, Fullerton College, Pasadena City College, research on the 150 community colleges in the Achieving the Dream project) on the need for a integrated student support system for tracking, intervening and following-up with cohorts of students at *critical points of their progression towards goal attainment*. Critical points include orientation and assessment to exploration, planning, monitoring progress, and successfully transitioning into STEM careers and/or transfer to a four–year institution; and (5) outcomes of SBCC field tests of learning communities that allowed students to complete a year of basic skills math course work in one semester. Outcomes also included three years of demonstrated substantial increases in course completion and college persistence rates for students enrolled in basic skills and first year general education classes that were part of the SBCC's award winning Gateway to Success tutoring and supplemental instruction program. **Curriculum Alignment with K-12, SBCC and four-year universities** The *Toolbox Revisited* notes "The story starts in high school, but merely crossing the bridge to college or community college doesn't mean the story is over…the bridge is not always aligned with the road on the other side." Moreover, as noted above, each campus of CSU and UC systems must forge its own articulation agreements; there is no system-wide acceptances of course work from community colleges.

4. QUALITY OF PROJECT PERSONNEL

a. Quality of the Project Director. The person responsible for the management and supervision of the project and who will act as Project Director 100% of his time is Professor Ignacio Alarcon. Because the project focuses on STEM curriculum development, articulation and learning

communities, it is important to have someone who has had experience in both curriculum development and learning communities direct the project. Moreover, this role demands someone with administrative experience and experience in directing complex projects. Because the project is fully staff and faculty-driven, it is critical to the success of the project that the Project Director be a person respected among faculty, staff, and administrators for his leadership and experience in developing innovative programs and working with students. Ignacio Alarcon, Professor of Mathematics and President of the Academic Senate, more than fulfills this. He has been instrumental in the conceptual design of the STEM project and has provided leadership from its inception. Mr. Alarcon brings a wealth of experience designing and implementing innovative, complex projects, working collaboratively with all the partners in this project, both faculty and staff. Ignacio is an experienced faculty/administrator, has a strong commitment to helping underprepared students succeed and is an innovator who has instituted systemic change in education focused on Basic Skills for underprepared and underserved students. Dr. Alarcon has been an active participant in his professional organizations, the California Mathematics Council Community Colleges South, of which he was president from 2002 to 2004, and the American Mathematical Association of Two Year Colleges, where he chaired the Equal Opportunity in Mathematics Committee. Originally from Mexico, he received a Masters degree in Mathematics and a Masters in Applied Statistics from Ohio State University. Before coming to Santa Barbara City College in 1997, Ignacio was a full-time lecturer of Mathematics at the California State University Bakersfield for five years, where he was lead math faculty of the CSU Alliance for Minority Program (AMP) in its CSU Bakersfield/Bakersfield College version. The CSU AMP was funded by the National Science Foundation in the early 1990s, and focused on recruitment and transfer of minority community college students to their regional CSU in STEM fields.

Ignacio has 19 years of instructional and administrative experience including curriculum design. He has chaired the Arts and Sciences Curriculum Committee at the California State University Bakersfield, the SBCC Curriculum Advisory Committee and currently teaches a Learning Community in the SBCC Express to Success Title V project.

b. Quality of Key Project Personnel. Key personnel for this complex project have been chosen for their outstanding leadership in their respective fields. Each of them has advanced degrees and extensive experience which has put them in leadership positions at SBCC and on the forefront in innovative program design to meet the needs of students and the regional economy. Each of the four (4) Co-Activity Coordinators will be reassigned 25% of FT to work with Faculty Leads (hourly) to facilitate the design and delivery of revised curriculum and support services; overseeing supplemental instruction, Gateway tutors, and support services activities; develop faculty development & training program, and; to integrate best practices into classrooms & services. The Faculty Leads will also oversee the STEM LCs, implement the STEM 101 and Science Night activities and work closely with the Articulation Specialist. A Scholarship Coordinator will secure student STEM internships and scholarship opportunities. A contracted Resource Development Specialist will develop strategies to help reduce the federal cost for undergraduate degree attainment in STEM degree and articulated programs by researching model projects, visiting funding agencies, training opportunities and technical assistance workshops. The qualifications and the job descriptions for these and other positions can be found in the Activity Detail Budget form.

5. ADEQUACY OF RESOURCES

The project budget fully incorporates funding for each of the components of the project, which will accomplish all of the process and performance objectives as noted in the Budget Narrative.

SBCC truly believes that transformation of the college to an institution that promotes success, particularly for Hispanic and low-income students, who are underrepresented in STEM fields, is dependent on the work of its current faculty and staff. SBCC has analyzed the necessary resources needed to successfully complete the proposed project. The proposed costs are reasonable in relation to the design, services, planned number of persons to be served, and significance of the proposed project as seen by the following leveraging of resources. Not only has *release time* for SBCC project personnel has been included in the budget, but also significant *institutional (inkind) contributions* of faculty and administrative time at no cost to the grant. The role they play in this project is so transformational to the college that they are assigned to work on it as a major priority in their current positions. To further support these efforts, the SBCC Foundation has designated this project as a priority and is *fundraising* for a student textbook loan program and student scholarships. SBCC has a strong history of collaboration in STEM programming with its primary four-year transfer institutions, UCSB and Cal State Channel Islands. SBCC Professors Nick Arnold and Jens-Uwe Kuhn serve as co-principal investigator and lead faculty in a community college summer research institute in the California Nano-Systems Institute. SBCC frequently partners with UCSB on STEM grants, such as a current project spearheading the development of a Nanoscience and Society course, *the first to be offered at a community college*. Cal State Channel Islands will contribute *the joint use of facilities and labs as well as equipment* provided to the SBCC Chemistry Department (computer and remote instrumentation operation software) to enable students enrolled in organic chemistry classes at SBCC to take advantage of analytical chemistry instrumentation at Cal State Channel Islands. Students at SBCC have thus gained access to sophisticated instrumentation, such as gas-chromatography and nuclear magnetic resonance spectroscopy, that they would otherwise not

have access to. This has introduced a new level of project-based instruction and research components into the curriculum, and the students have obtained critical instrument operation skills. Upcoming collaboration with Cal State Channel Islands includes development of enhanced articulation for STEM course sequences; alignment of student learning outcomes for articulated STEM classes; collaborative research opportunities in STEM for students and faculty; offering of STEM workshops and mentoring for transfer students; and a STEM Diversity Series providing nationally-recognized guest speakers on topical diversity issues in STEM. The cost of renovation for the STEM Center will only involve low cost renovation to an existing classroom space to maximize resources and expedite completion so student use can convene. SBCC is able to actualize this comprehensive project in large part because it already has many resources in place within its institutional initiatives and partnerships with agencies, industry, and K-12 districts, in addition to resources for field-based experiences and internships noted below: *Express to Success* – This U. S. Department of Education Title V funded program addresses the low progression and completion rates of students entering the college in basic skills by providing a structured and accelerated academic and support program utilizing learning communities. *Math, Engineering, Science, Achievement* (MESA)- The SBCC MESA program helps bridge the gap of underrepresented minorities participating in post-secondary STEM majors through family involvement, pathways to college, culturally enriched teaching, personalized academic counseling, mentoring and peer networking. Funded through a grant from the California Community College Chancellor's Office, the SBCC MESA program has proven to be a model support program since its inception in January 2007. *The Society of Hispanic Professional Engineers (SHPE)* – The President of the local chapter is a SBCC alumnus who began his studies as a student of ESL, transferred to Cal Poly State University, San Luis Obispo and is now an

engineer at Raytheon. He and other professionals provide significant support to SBCC and UCSB SHPE through workshops, national conferences and an e-mentoring program which links individual students with an industry mentor. *P-20 Council* – Chaired by the Dean of the Graduate School of Education at UCSB, administrators, faculty and industry leaders from pre-school to university in county meet regularly to collaborate, share resources and develop strategies to increase the academic success, particularly of Latino students. *CalPASS* – Faculty from the SBCC department of Mathematics play an integral role in the Santa Barbara County Mathematics Professional Learning Council, with a focus on aligning curriculum between middle school, high school, community colleges, UCSB and CSUs. *Internships in Nanosystems, Science, Engineering and Technology (INSET)*- provides summer research opportunities for community college students.. *Partners in Education* – SBCC has longstanding active participation in this organization of local leaders in education and industry. *Partners in Education* provides mentors and presenters in middle and high school classes and develops internships in local industries. *Dos Pueblos High School Engineering Academy* and *Santa Barbara High School STEM Academy* – These two local high schools motivate high school students to become engaged and prepared for college in STEM majors, and many make their path through SBCC. The faculty director and inspiration at DPHS, was awarded a MacArthur Genius Fellowship in 2010. The SBHS program is just starting up, with the mission of recruiting Hispanic and low income students as they enter 9th grade and preparing them for college. *SBCC Student Organizations* – Student involvement out of the classroom provides opportunities for leadership development and project design and implementation such as Women in Science and Engineering (WISE), Student Leaders in Science, Society for the Advancement of Chicanos and Native Americans in Science (SACNAS), Student Sustainability Coalition, and the Math Club.

6. QUALITY OF THE MANAGEMENT PLAN

a. SBCC has planned project management and evaluation to ensure that all federal requirements are met and there is efficient and effective project implementation. The following table outlines the plan to achieve the objectives of the SBCC STP including the activities and persons responsible for completing tasks within budget and according to timelines and milestones. The STP Leadership Coordination Team will be responsible for coordinating, implementing and monitoring the project. The team will include the Co-Activity Leads, lead faculty from the sciences, mathematics and counseling, the Executive Vice President Educational Programs, The Vice President of Institutional Research and the Dean of Math and Science. This team will meet weekly during Fall 2011 and then on a schedule determined to ensure success of the project. All project personnel will report directly to the Project Director.

Formation of STEM Transfer Program. *Project Director; STEM Co-Activity Leads, Faculty Leads*. Appoint faculty, managers, staff and students in leadership roles to serve on the STPAdvisory Board and to implement core components of project. Recruit students into the STP. Coordinate with K-12 school districts, teachers, counselors, and administrators; business partners (who will provide mentors in science and math); STEM professional organizations; parents. **Milestones:** Advisory Board is in place composed of diverse sectors of the community with vested interest in the project and history of collaboration. **October 2011.**

High School Outreach. *Project Director, SBCC Articulation/Transfer Coordinator; STEM Co-Activity Leads, Faculty Leads, STEM Counselors, Mentors*. ♦Conduct outreach to schools, community *with emphasis on parents.* ♦ Coordinate with SBCC outreach programs with K-12 partners targeting increased success in high school and increased Hispanic enrollment in postsecondary education STEM programs ♦ Include development and implementation of information for STEM program including dual-enrollment ♦Use variety of media, e.g., brochures, posters, radio, newspapers, TV, electronic media, presentations. ♦Showcase STEM 101, Science Nights, Summer Bridge, Parent Nights leading to enrollment in STEM transfer programs. ♦ Video presentations and peer visits to each high school-ensure bilingual formats. **Milestones:** Network of informed high school students, schools. Hispanic parents gain knowledge of SBCCs summer programs and STEM opportunities and learn the importance of encouraging and supporting their children's early choice of enrollment in STEM program at SBCC and transfer. **October 2011**, outreach to high schools. **Spring 2012**, Science Night at SBCC; Implementation of STEM 101 **Fall 2012 and subsequent years 2-5.**

Early Identification of Potential STEM STP Students. *Outreach Coordinator, High-School-to-SBCC staff, Articulation Coordinator, Transfer Counselor, Activity Coordinators and student services staff; high school staff.* ♦Answer inquiries. ♦ Solicit/respond to referrals and recommendations from schools, parents, community partners. ♦ Encourage students to take EAP ♦ Make direct contact with students and parents via STEM 101and Science/Parents Night, Early Decision, and High-school Science Academies. ♦Determine criteria for selection for STEM 101. **Milestones**: Production of SBCC STEM Video Series for use in high school visits, SBCC basic skills classes and website– Fall 2011; SBCC STEM *Ambassadors* visit STEM academies at each of the regional high schools and 9th grade Dual Enrollment Freshman Transition Initiative classes – **Spring 2012 and ongoing**; High School/SBCC Counselor and STEM Teacher Conference - 40 teachers and counselors will meet for an update session with break-out sessions specific to math and science curriculum, STEM Pathways information and transfer status updates. **Spring 2012 and each subsequent Spring**; STP Science Night – An evening of major and career information in a hands-on format for high school students and parents – **Spring 2012 and each subsequent Spring**; STP STEM 101 –An intensive three-day program for incoming students-**August 2012 and each subsequent January and August.**

Dedicated STEM Center *STEM counselors and Articulation/Transfer Coordinators, Faculty* STEM technology will outfit this renovated classroom space with high tech communication tools and will serve as hub for the STEM project. ♦Conference rooms with video conferencing capabilities **Milestones:** ♦synchronous on-line tutoring, supplemental instruction and video conferencing ♦online workshops (students-to-STEM professionals, faculty-to-faculty, and faculty to professionals). ♦Asynchronous tools to support instruction with discussion boards ♦Access to on-line interactive thinking tools ♦ IPod podcasts and YouTube videos of student interviews of STEM professionals ♦ Renovation begins **Year 2 2012, completed in Year 3 2013**

Upgrade Technology and Expand Capacity *Instructional and Information Technology Coordinators, Faculty Leads*. To provide access to state-of-the art learning environments for STEM students ♦Purchase and install all equipment for the STEM Success Center, faculty development, and for SMART classrooms; **Fall 2010**. ♦Update SBCC technology and science labs. ♦Begin necessary remodel/renovation to accommodate new Center. **Milestones:** Upgrade Computer Science Laboratory and Classrooms and Chemistry Laboratories with state-of-the-art equipment for project based learning by **Fall 2012.** Outfit two additional laboratories to meet increased demand by **Fall 2013.**Modify curriculum and instruction to incorporate technology and teach more effectively. Students use technology for independent study, tutoring, Supplemental Instruction, and Directed Learning activities. **Nov 2011–Feb 2012.**

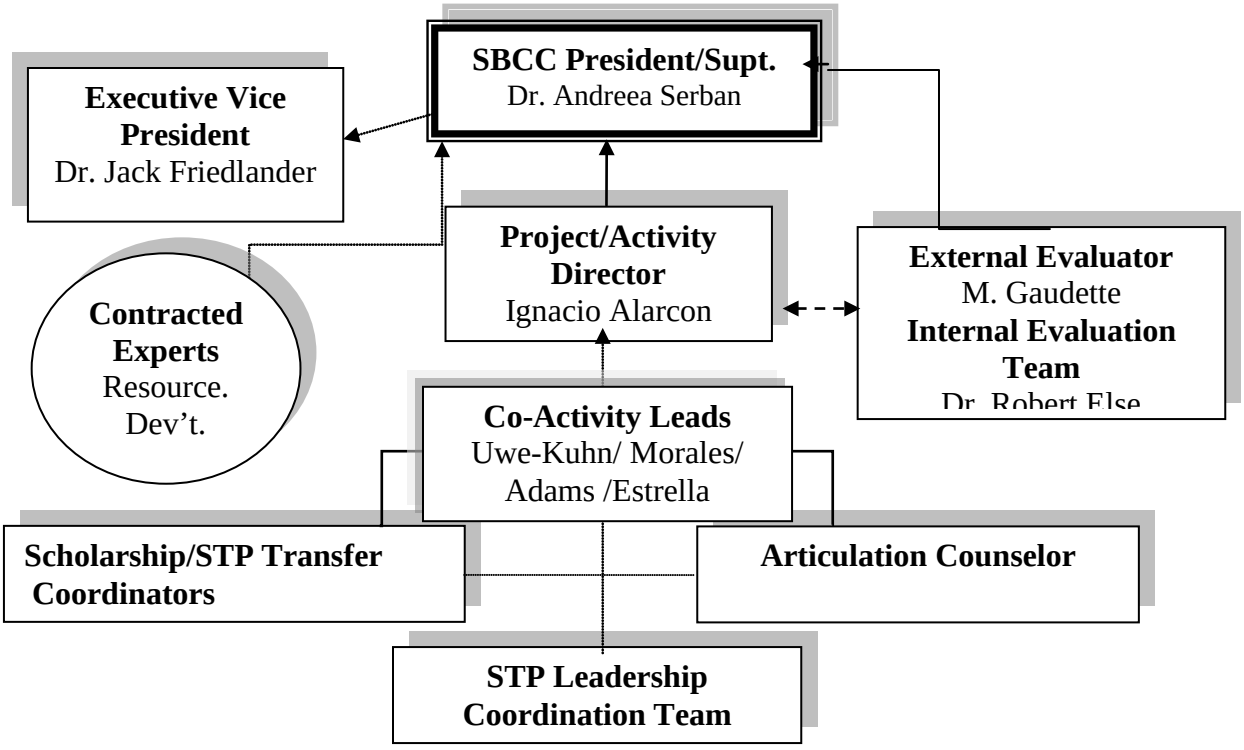
Faculty Inquiry Groups/Curriculum Revision and Faculty Professional Development – *Science, Math Lead Faculty and Lead Counselors* ♦To develop learning communities, revise curriculum and develop directed learning activities. ♦ To development training for teaching strategies for under-represented STEM students. **Milestones**: Develop curriculum and STP Learning Communities **Fall 2011 and Spring 2012**; Implement STP Learning Communities **Spring 2012 and Fall 2012** and ongoing; Faculty Professional Development Workshops focused on teaching strategies specific to under-represented students, project-based learning and effective strategies for student intervention to begin in **Spring 2012** to continue in subsequent years.

Strengthen Counseling – *Lead Counselor* ♦ To provide individualized counseling to ensure that students enroll in appropriate STP LC's in a structured sequence. **Milestones:** Develop STEM Curriculum Pathways. **Spring 2012 and ongoing.** Provide workshops and individualized Educational Plan development of STP students. **Fall 2011 and ongoing**. Provide faculty in-services for ESP and STP faculty. **Fall 2012 and ongoing**.
Expand Articulation – *Articulation Coordinator* To strengthen existing and develop new STEM transfer agreements with private and out-of-state universities **Milestones:** ♦Monitor and update current articulation agreements beginning in **Fall 2011** and ongoing. ♦Develop new articulation agreements with California private and out-of-state universities. **Spring 2012** and ongoing.
Scholarship Support and Student Internship and Professional Experience - *Scholarship/ Activity Coordinator, Lead Faculty and Counselors* ♦Research, develop scholarships, internships. ♦ Provide workshops/ support for student applications, organize conference. **Milestones**: ♦ Develop a database of STEM scholarship/ internship opportunities. **Spring 2012** and ongoing. ♦ Provide application workshops and individualized assistance. **Spring 2012** and ongoing. ♦ Select students for conference attendance and coordinate. **Spring 2012**
Expand Transfer Services - *Lead Transfer Center Counselor* – To provide support for successful transfer in STEM fields. **Milestones**: ♦ Present workshops and provide individualized assistance in transfer applications. **Spring 2012 and on**going ♦ Organize and lead college tours to include UCSB, Cal Poly and UCLA, **Fall 2012 and ongoing**.
Develop Student Tracking System – *Director of Institutional Research and IT staff* **Milestones:** ♦Develop the STEM specific tracking system, **Fall 2012 – 2014.**

b. Procedures for Ensuring Feedback and Continuous Improvement in Project Operations

Ultimate project authority and responsibility rests with Superintendent/ President Dr. Andreea Serban and Executive Vice President, Dr. Jack Friedlander, who will delegate administrative and supervisory authority to the STEM Director, **Ignacio Alarcon**. **Reporting**: Dual reporting to the President and Vice President of Academic Affairs will ensure Mr. Alarcon has direct access to the President and President's Cabinet. As the **STEM Director**, he will provide day-to-day supervision. The **Activity Coordinators** will report to Mr. Alarcon and will be given authority to support and implement the activities over which they hold responsibility. *See Key personnel for qualifications and resume briefs*. A STEM STP Leadership Coordination Team of all Key Personnel will meet quarterly and report to the President to provide consultation with project Below is an **Organizational Chart of the STEM Project Management team**.

Organizational Chart of the STEM Project Management team

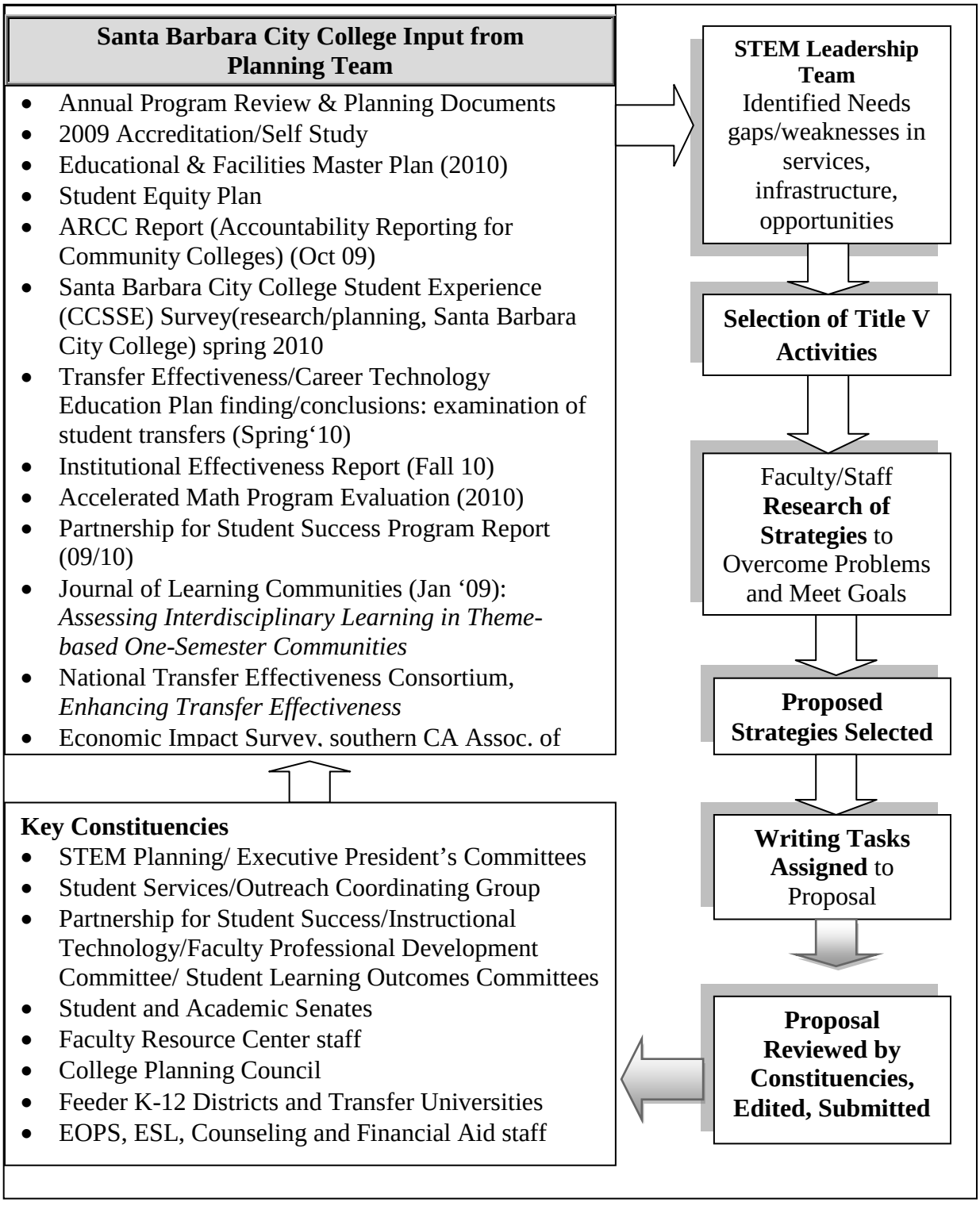


	Project Management Procedures
Project Manual	♦ Comprehensive manual developed by STEM Director specifies all operating guidelines, policies, procedures, responsibilities, authority, job descriptions, forms, reporting timelines. ♦ Distributed to STEM staff, President and Evaluation Team
Title V Staff Meetings	♦ Bi-weekly meetings with Activity Directors and Project management team. Identify and remedy problems, monitor progress of project activities. Individual meetings held with project staff to address methods for increasing the success of the activity. ♦ Minutes recorded, filed in Project Manual.
Time/Effort Reports	♦ Reports detailing time and effort by all full-time and part-time Title V employees, submitted to and signed by the STEM Director.
Monthly Progress Reports	♦ Progress reports to STEM Director, implementation progress, formative evaluation reported to the President and internal Evaluation Team.
Quarterly Reports	♦ Quarterly Report from the STEM Director, assisted by SBCC IR Office summarizing progress toward Activity Objectives. ♦ Quarterly reports form the basis of briefings for President's Cabinet, administration, and staff.

Annual Reports	♦ Annual performance report submitted, prepared by STEM Director.
Fiscal Reports	♦ Monthly expense/budget status reports from Office of Institutional Research & Planning programs to STEM Director.
Personnel Procedures	♦ Institutional policies and procedures followed for filling STEM Positions; adherence to required state and federal affirmative action policies. (SBCC compliance with GEPA, Section 427, Assurances) ♦ STEM Dir. maintains information regarding grant-funded professional personnel
Equipment Inventory	♦ All equipment purchased through STEM funds tagged accordingly. STEM Director maintains up-to-date equipment inventory.
Inst. Governance	♦ STEM Director and Activity Directors meet quarterly with Evaluation Team, serve on appropriate institutional committees, task forces.

c. Mechanisms to Achieve Management Outcomes and High Quality Products and Services

During 2009, Santa Barbara City College underwent major self-study and master planning processes which identified needs that led directly to this project and involved task forces of college constituencies (students, faculty, staff, administrators, Board members and the community). SBCC identified major obstacles to student *progression, persistence and degree completion* and degree attainment for underprepared Hispanic students in STEM which formed the project goals and objectives for the SBCC **STEM Transfer Project** (**STP**). A STP Leadership Team was formed and conducted the following planning process to establish and achieve high quality programs and services that will guide the management of the project. Under the direct leadership of the Dean Educational Program, MS. Marilyn Spaventa has led an extensive planning effort in cooperation with the STEM faculty and the Project Director for this project from start to finish using a process that *ensures full college-wide support and continued engagement and institutional commitment to the project*. The Chart below illustrates the extensive planning efforts and processes undertaken by the STEM planning team, followed by a list of planning team members and their commitment to the project design and implementation.


Santa Barbara City College Input from Planning Team
Annual Program Review & Planning Documents
2009 Accreditation/Self Study
Educational & Facilities Master Plan (2010)
Student Equity Plan
ARCC Report (Accountability Reporting for Community Colleges) (Oct 09)
Santa Barbara City College Student Experience (CCSSE) Survey(research/planning, Santa Barbara City College) spring 2010
Transfer Effectiveness/Career Technology Education Plan finding/conclusions: examination of student transfers (Spring'10)
Institutional Effectiveness Report (Fall 10)
Accelerated Math Program Evaluation (2010)
Partnership for Student Success Program Report (09/10)
Journal of Learning Communities (Jan '09): Assessing Interdisciplinary Learning in Theme-based One-Semester Communities
National Transfer Effectiveness Consortium, Enhancing Transfer Effectiveness
Economic Impact Survey, southern CA Assoc. of
STEM Leadership Team Identified Needs gaps/weaknesses in services, infrastructure, opportunities
Selection of Title V Activities
Faculty/Staff Research of Strategies to Overcome Problems and Meet Goals
Proposed Strategies Selected
Writing Tasks Assigned to Proposal
Proposal Reviewed by Constituencies, Edited, Submitted
Key Constituencies
STEM Planning/ Executive President's Committees
Student Services/Outreach Coordinating Group
Partnership for Student Success/Instructional Technology/Faculty Professional Development Committee/ Student Learning Outcomes Committees
Student and Academic Senates
Faculty Resource Center staff
College Planning Council
Feeder K-12 Districts and Transfer Universities
EOPS, ESL, Counseling and Financial Aid staff

TITLE V STEM PROJECT PLANNING TEAM ***Directly Involved in Analysis, Meetings, Design, Writing, and/or Submission of STEM Application***	
• Ignacio Alarcon, President Academic Senate, Mathematics Faculty (HIS STEM Director) • Kathie Adams, Director, Transfer Center • Nick Arnold, Engineering Faculty and MESA Faculty Advisor • Eric Bullock, Chemistry Faculty • Laura Castro, Counselor/Articulation Officer • Allison Chapin, Coordinator Mathematics Tutorial Laboratory • Robert Else, Sr. Director, Institutional Research, Assessment & Planning • Virginia Estrella, Coordinator MESA • Jack Friedlander, Executive VP • Noe Gonzalez, MESA Student • Adam Green, Environmental Studies Faculty, Director Center for Sustainability • Jens-Uwe Kuhn, Chemistry Faculty • Jennifer Loftus, Mathematics Faculty • Michael Medel, Director Outreach/ Orientation • Victoria Melero, MESA Student • Bronwen Moore, Chair Mathematics	• Nilesh Oza, MESA Student • Ben Partee, Dean Educational Programs • Michelle Paddack, Biological Sciences Faculty • Christopher Phillips, Director, Career Center • Heather Rose, Biological Sciences Faculty • Jan Schultz, Earth and Planetary Sciences Faculty • Marilynn Spaventa, Dean Educational Program • Barry Tanowitz, Chair Biological Sciences • Laurie Vasquez, DSPS Counselor and Faculty Resource Center Assistive Technology Specialist • Sheila Wiley, English Skills Faculty, Co-Director Gateway Tutoring Program • Lauren Wintermeyer, Coordinator Dual Enrollment • Marsha Wright, Director, EOPS • Michael Young, Chair Physics • Juan Zepeda, MESA Student • Maria Morales, Co-Chair Counseling • Dean Nevins, Chair Computer Science

The most important for quality assurance in this challenging project is the committed leadership and well-planned role of the selected Project Director, Ignacio Alarcon and the planning team. Mr. Alarcon has over 19 years instructional and administrative experience at CSU Bakersfield and SBCC; chaired the Curriculum Committee and is the current Academic Senate President; was president of the California Mathematics Council Community Colleges South (2002 – 04) and chair of the Equal Opportunity Mathematics Committee; teaches a LC in the Express to Success Title V project. Mr. Alarcon will work with faculty and instructional, student support,

and student services administrators in planning development activities and will coordinate the activities with the high school instructional and counseling staff. The combined skills and experiences of Mr. Alarcon assure the success in this complex project. *Dean Spaventa* will play an integral role in her *administrative capacity* (no cost to the grant) by committing time to coordinate efforts between SBCC and four-year universities to provide the seamless transition to upper-division programs in STEM fields, alignment of curriculum in the targeted majors and development and implementation of a STEM dual enrollment system. These components involve the ability to work with external consultants, research functions, and the ability to plan and conduct intervention strategies between high schools and college and university partners.

7. QUALITY OF THE PROJECT EVALUATION

Methods Include Objective Performance Measures to assess project goals and objectives will include student enrollment in the STP LCs and additional required courses, course completion rates in courses required to complete lower division math, general education and major field degree and transfer requirements for STEM majors, adherence to the STEM Curriculum Pathways, and application, acceptance and attendance rates to transfer institution. *Attainment of Project Goals and Objectives*: The evaluation plan will meet federal reporting requirements for formative evaluations and a year-end report each year, as well as a final evaluation. Accountability address both outcome and process objectives. Evaluation will use objective quantitative data and qualitative measures, as appropriate. The evaluations will be based on comparing cohorts of students that joined the Science Transfer Program versus those that did not. The comparisons will be based on comparable student characteristics (e.g., demographics; assessment placement levels GPAs, educational and major field objectives). A continuous feedback model, described below, will provide both quantitative and qualitative data for

evaluation and corrective measures in a timely manner. Relevant participant and control cohort baseline, formative, and exit level objective data will be collected. **Data Collection Procedures and Analysis** Standard data analysis techniques will be employed to provide clear and descriptive formative and summative data. Data collection and analyses will be ongoing and used to determine what program adjustments are needed to meet student attainment of their degree and transfer objectives. This feedback and evaluation will be instrumental in staff training and program progress. Feedback from participants and consistent monitoring of student progress will provide early warnings for staff work with the student and facilitate improvements. Staff will have support from the Institutional Researcher, External Evaluator Coordinator, Transfer and Articulation Specialists and Information Technology. **Guidance for Effective Continuation and Expansion of the STEM Pathway Project Model** The STP will provide a model which addresses key factors important for continuation or expansion purposes: adequacy of timelines to accomplish the goals and objectives; effectiveness of outreach and recruitment efforts participation in the Dual Enrollment program courses and the Dual Enrollment Freshmen Transition Program; **seamlessness of the STEM Curriculum Pathways**; STP and contextualized ESP LCs for students preparing to enter STEM programs; adequacy of the Student Pathways Tracking System; integration of articulation agreements into students individual educational plans and the STEM Curriculum Pathways; data collection system; data analysis techniques to achieve in-depth evaluation of the effectiveness of each intervention toward the accomplishment of the project objectives; and the level of institutionalization a result of STEM Transfer Project. **Methodology for Evaluating the Model Including Data Analysis Procedures** Carefully monitoring of progress toward meeting project objectives requires an examination of the effectiveness of implementation strategies for each intervention through a

continuous feedback process. Research staff will support these efforts with correlation and regression statistic techniques to identify the strengths of relationships of project activities and interventions with attainment of project outcome measures. ***This will trigger an in-depth analysis of various processes leading to the identified problem area.*** The STP *Leadership Team* is chaired by the project director and includes each project lead, the dean for Sciences and Mathematics, and the Senior Director of Institutional Research and Planning (IRP). The STP *Coordination Team*, chaired by the project director, will be comprised of the leads and other interested members of the project implementation teams and will coordinate project activities, progress reports, and review the formative and summative evaluation data and strategies for continuous improvement. The STP *Internal Evaluation Team* will be headed by Robert Else, SBCC's Senior Director of IRP. The STEM PD, the Executive Vice President of Educational Programs, four (4) Activity Coordinators, and the external evaluator will evaluate the project.

OBJECTIVES	Data Elements Related to Goals, Objectives, Outcomes
STEM Course Success and Progression	• Information on course success -end of term grade files MIS • Student progression through Basic Skills math and English sequences to STEM courses across multiple terms
Equity: Demographic Sorting of ALL Outcomes	• Demographic information on students derived primarily from student responses to questions on application for admission to college and application to join the STP
Piloting Alternative Strategies	• Success of students in the pilot year STP LCs and faculty and staff assessment of the LCs and each of the STP activities (e.g., outreach, in-take, Science Week, pilot year for STP LCs), number of STP LC sections piloted, alternative strategies tracked by Project Director
Prof. Development Instructional Delivery	• STEM faculty (full and part-time) participating in professional development tracked by Project Director • Annual faculty survey will monitor integration of new knowledge into STEM curriculum and course delivery

External Evaluation In addition to the internal monitoring, SBCC has obtained a well-qualified external evaluator to design the evaluation process and to regularly assess all dimensions of the

project, Dr. Michael Gaudette of Lighthouse Consulting. An independent external evaluation will be conducted by Lighthouse Consulting, Inc. a higher education evaluation firm with extensive Title II , Title V, and CCRA/STEM evaluation experience (evaluations of Title III and Title V projects in 30 community colleges). Lighthouse Consulting's president, Mike Gaudette, worked with the STEM planning team to assure that objectives were measurable and relevant to major problems of the institution, baselines were valid, and the design of the Evaluation Plan was reasonable. Each year's evaluation will include multiple deliverables: 1) progress toward objectives, 2) sustainability of the project after federal funding ceases (institutionalization), 3) overall institutional impact of the project upon the college (strengthening the institution), 4) individual project activities based on data collection and statistical, 5) compliance with applicable federal regulations, and 6) recommendations for improvement.

<table>
<tr><th colspan="4">Dr. Michael Gaudette– External Evaluator</th></tr>
<tr><td>Education</td><td colspan="3">M.B.A. Business (1990) City University Bellevue, WA
A.B.D. Education (1994) Oregon State University Corvallis, OR</td></tr>
<tr><td>Professional Experience</td><td colspan="3">Managed and written Title III/V/CCRA grants for 22 years, edited applications as a consultant, Department of Education Title III/V peer reviewer, and evaluated over three dozen Title III/V/CCRA projects over the past four years.</td></tr>
<tr><td>Awards & Publications</td><td colspan="3">Past national president (1999-2000) Council for Resource Development (professional association of community college fundraisers). Presenter to local, state, regional national audiences of community colleges, boards financial professionals.</td></tr>
<tr><td colspan="4">Dr. Gaudette will work with SBCC to schedule evaluative activities according to the following:</td></tr>
<tr><th>Grant Year One</th><th colspan="2">Grant Years Two, Three, Four</th><th>Grant Year Five</th></tr>
<tr><td>Assist in design of:
Tracking access
Data elements
Data collection
Evaluation processes</td><td colspan="2">Conduct "mid-term" assessment of progress
Recommend changes to research design
Examine evaluation progress</td><td>Assist in design of:
Final summative assessment of impacts of project on institutional goals
Institutionalization</td></tr>
</table>