

Cover Page Citrus College

CONTACT INFORMATION

Coordinating Institution: Citrus College

Contact Person's Name and Title: Dr Arvid Spot, Vice President of Student Services & Interim Vice President of Academic Affairs

Contact Person's Email Address: aspor@citruscollege.edu

Contact Person's Phone Number: 626-914-8534

Contact Person's Mailing Address: 1000 Foothill Boulevard, Glendora, CA 91741-1899

LIST OF PARTICIPANTS

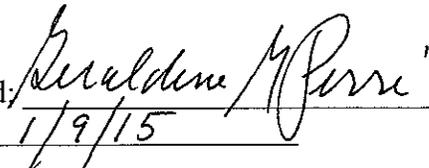
Citrus College

APPLICATION ABSTRACT

Citrus College has devoted considerable effort in developing a full suite of services for two of its most important programs: (1) Boosting student involvement and success in science, technology, engineering, and mathematics (STEM) education and (2) Increasing the success of veterans by providing holistic support services. Much of the college's focus on helping the nation meet goals for establishing a strong STEM workforce has centered on serving Hispanics, a traditionally underserved population. Recent innovations in STEM learning include implementation of Faculty Inquiry Groups (FIGs), which serve as a collaborative model for initiating progressive, student-centered learning methods. Other important components of Citrus College's STEM focus include the Summer Research Experience (SRE), which provides students rich research experiences at universities and with business and industry, Supplemental Instruction (SI), which targets historically difficult courses to increase student performance/retention, and SIGMA (Support and Inspire to Gain Motivation and Achievement), a peer mentoring program that connects college students to their peers in a cooperative student support system. For veterans, Citrus College was also the first of five Southern California college campuses to add a Veterans Success on Campus (VSOC) program, a dedicated Rehabilitation Counselor program funded by the VA. This program is now housed in a new Veterans Success Center equipped with computers, confidential counseling offices, confidential space for eligibility certification, a lounge, a kitchen, and an outdoor quiet space providing an optimal opportunity for a holistic approach to veteran student support.

ASSURANCE AND SIGNATURE.

"I assure that I have read and support this application for an award. I understand that if this application is chosen for an award, my institution will be required to submit, for approval by the Committee on Awards for Innovation in Higher Education, a report indicating proposed uses of the award funds and, as the fiscal agent, will be responsible for distributing funds to any other participating entities. I also understand that, if this application is selected for an award, my institution will be required to submit reports to the Director of Finance by January 1, 2018, and by January 1, 2020, evaluating the effectiveness of the changes described in this application."

Signed:  Geraldine M. Perri, Ph.D. Superintendent/President

Date: 1/9/15

Citrus College: A College of Completion for Historically Under-served Students

Boosting STEM Achievement and the Collegiate Success of Veterans

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CONTEXT

1. GOALS FOR ACHIEVEMENT

Citrus College has a long established record of innovation that gets results. In particular, our college will highlight in this application two successful programs in which we have significantly increased student success: RACE to STEM and Operation VETS.¹

STEM: Established in 2011 with the support of a 30+ member stakeholder committee

Science, technology, engineering, and mathematics (STEM) fields have become increasingly central to our nation's economic competitiveness and growth. Yet, science and technology industries have twice as many job openings as there are sufficiently prepared U.S. workers ready to step into these jobs. At Citrus College, we are helping to meet this challenge by establishing two overarching goals aligned with the priorities of the Awards for Innovation in Higher Education by boosting STEM achievement, especially for under-represented students such as Hispanics:

1. Increase the number of STEM majors.
2. Increase the number of transfers to four-year institutions.

Such goals have driven a continuous process whereby our college has established a number of short-term, near-point goals, which include:

1. Increase the effectiveness of instruction, focusing especially on student-centered learning.
2. Provide real-world, experiential opportunities for learning science.
3. Develop a range of programs for middle and high school students in college feeder districts.
4. Strengthen and enhance academic support services.
5. Provide a streamlined, articulated pathway from basic skills to career/four-year college entry.
6. Organize and analyze data to drive informed decision-making.

Operation VETS (Veterans): Established 2010 with a 20+ member stakeholder committee

Citrus College appreciates the sacrifices made by our veterans, not only during their time of active service but also after they entered lives as civilians. In response, we have designed and implemented a set of strategies to create a cohesive, holistic and consistent approach that would increase persistence rates, better support veterans in mathematics, address their stated need for more mentoring, address their transitional issues, and decrease probation/dismissal rates. Our college identified a number of goals to help veterans transition into college life which are aligned with the Awards for Innovation in Higher Education.

1. Decrease the percent of veterans on probation/dismissal.
2. Increase the number of veterans accessing our college classrooms.
3. Increase enrollment of veterans in transfer level mathematics.
4. Increase veteran students' persistence rate.

Again, to achieve these goals we have established a number of short-term, near-point goals:

1. Help veterans overcome sub-skill barriers, particularly in math.
2. Provide additional mental health services.
3. Raise awareness among veterans about the college's programs, services, courses, and overall issues impacting veteran transition.

¹ RACE (Rise Above Challenges Exponentially); VETS (Veterans Education & Transitional Services)

2. OUR STUDENT COMMUNITY

As shown by the following table, our student body largely mirrors the multi-cultural, multi-racial richness and varied socio-economic climate of the state.

Table I: Demographics of Citrus College’s Student Population (n = 13,245)

Racial/Ethnic Group	Total*	Male	Female
American Indian/Alaskan Native	23 (0.20%)	13 (0.20%)	8 (0.10%)
Asian	1,519 (11.5%)	745 (12.0%)	743 (11.0%)
Black/African-American	582 (4.4%)	277 (4.6%)	293 (4.4%)
Hispanic or Hispanic	7,816 (59.0%)	3,475 (57.0%)	4,236 (61.0%)
Native Hawaiian/Pacific Islander	23 (0.20%)	9 (0.10%)	14 (0.20%)
White	2,724 (20.6%)	1,284 (21.2%)	1,396 (20.1%)
Some Other Race	—	—	—
More Than One Race	383 (2.9%)	181 (3.0%)	195 (2.8%)
Unknown Ethnicity	175 (1.3%)	78 (1.7%)	76 (1.1%)
Current/Former Foster Youth	63 (100%)	30 (48.0%)	33 (52%)
Students With Disabilities	789 (100%)	399 (51.0%)	380 (48.0%)
Low-Income Students	509 (100%)	179 (35.0%)	326 (64.0%)
Veterans	268 (100%)	230 (86.0%)	36 (13.0%)

* Male and Female columns do not necessarily sum to total because a small number of students often failed to identify their gender on surveys.

RACE to STEM: Addressing student obstacles through the STEM Academy

Much of Citrus College’s efforts to help fill the needs of the STEM workforce centers on support of under-represented populations. For example, we have extended considerable effort to raise Hispanic participation in STEM majors. We also identified two problems that helped drive the design of the STEM Academy:

- Too few Hispanic students are successfully completing all requirements necessary to graduate with an associate’s degree or to become “transfer prepared” in STEM fields.
- Hispanic STEM transfer rate at the college is substantially lower compared to other ethnicities.

Hispanic students wishing to pursue STEM careers face many barriers²:

- *Collegiate climate* — They often struggle adjusting to college life and its academic demands.
- *Lack of mentorship* — A lack of role models and peers in STEM majors often makes them feel isolated, with the subconscious feeling that perhaps STEM “isn’t for them.”
- *Cultural barriers* — They often must contend with cultural barriers within their own families and in STEM classrooms and programs.
- *Financial hardship* — Many must continually work to support themselves or their families, negatively impacting their ability to focus on academics.

To improve the academic and collegiate climate for Hispanic students and provide better mentorship for them, Citrus College created the **STEM Academy** in 2010 (funded in part

² <http://www.exploringcs.org/wp-content/uploads/2010/09/latinos.pdf>

through a Title V grant). We offer the full range of financial aid and scholarship and hire STEM students for campus jobs to minimize their need to work off campus, all the while proactively informing students of their eligibility for aid and scholarship. Moreover, we recognize how scheduling and extensive articulation of courses contribute to reducing the time it takes to complete a degree program and overall college costs; therefore, our college has expended considerable effort into streamlining these career paths.

Operation VETS: Addressing veteran student obstacles through the Veterans Success Center

Many factors contribute to our veteran students' inability to achieve success:

- *Feelings of isolation* — veterans are often older than the average student and have typically been out of high school for at least four years. As a result, they often feel out of place on college campuses and have trouble fitting in with the student body.
- *Study habits*—the highly structured military regimen often stands in stark contrast to the highly autonomous freedom experienced by college students. As a result, veterans often lack the study skills needed to compete in the classroom.
- *Mental health problems* — many veterans have extensive disabilities and mental health issues related to combat, such as post-traumatic stress disorder, often producing psychological conditions that make it difficult to succeed socially and academically. Also, they often have difficulty communicating with their own family, and coping with family adjustment issues.
- *Substandard math skills* — having been removed from formal math instruction for long periods, many veterans have long forgotten math skills learned in high school.

Citrus College has been able to address each of these barriers. Our critically-acclaimed **Veterans Success Center** was built primarily to provide veterans a comfortable place to call their home and study alongside fellow veterans. Our **counseling course** specifically tailored to veterans features a course of study centered on such soft skills as study habits and time management. To support its veterans in their time of need, the college has developed **special counseling services** specifically tailored to the types of mental health problems they typically face. Recognizing that such sub-skills as arithmetic and basic algebra are foundational to academic success, we also expanded our lineup of **support classes in mathematics**.

INNOVATIONS

3. KEY POLICIES, PRACTICES, AND SYSTEMS

RACE to STEM: In September 2011, Citrus College was awarded a five-year federal Title V grant, RACE to STEM, to increase the number of underrepresented students attaining AA/AS degrees in STEM and/or ready to transfer to four-year institutions to study STEM fields. The *STEM Academy* incorporates research-based strategies to increase student success:

Increase the effectiveness of STEM instruction: Citrus College has implemented **STEM Faculty Inquiry Groups (FIGs)**. These are teams of full-time and adjunct STEM instructors that meet regularly to examine their pedagogical practices closely and analytically, and then engage in routine in-depth conversations with their colleagues who teach similar courses about their reflections and pedagogical methods. These groups conduct course-level action research on a variety of relevant topics, making appropriate curricular and pedagogical adjustments to improve their practice and therefore student success.

Real-world, experiential opportunities: Through **experiential learning**, we actively promote applied learning, allowing students to make meaning from direct experience. As part of this program, our college has built relationships with numerous science industries and universities³ to place our students in laboratories each summer for structured summer research experience, a recognized high impact practice. On campus, student **research** teams provide interested and committed students with an opportunity to work on team-based, year-long STEM research projects culminating with intercollegiate competitions.

Middle and high school outreach & STEM preparation: Citrus College's **Secrets of Science Summer Camp (S3C)** provides local students with an opportunity to participate in on-campus hands-on biology, physics, engineering, and chemistry labs. During the final day of the camp, students attend workshops focused on how to pursue a STEM major and career. The college's **PAGE Program** (Pre-Algebra, Algebra, Geometry Enrichment) is a summer mathematics enrichment program for students in grades 6–10. This four-week intensive program offers students both a review of their previous math class as well as a preview of the upcoming class and contributes to their college readiness.

Academic support services: *Supplemental Instruction (SI)* targets historically difficult courses to increase student performance/retention. Citrus College's *SIGMA (Support and Inspire to Gain Motivation and Achievement)* program is a peer mentoring program that connects college students to their peers in a cooperative student support system.

Impact: The overarching goal of our STEM program is to increase the number of students attaining degrees in STEM, with a special emphasis on raising Hispanic representation. Comparisons over a five-year span show that the college has experienced a

- 47% increase in the number of STEM majors for all students and a 100% increase in STEM majors among Hispanic students (between the 2009-2010 and 2013-2014 academic years),
- 78% increase in awarded STEM Associate of Science degrees between 2009-10 and 2012-13; during this same time span, the number of such degrees conferred to Hispanics rose from 58 in 2009-2010 to 120 from 2012-2013, an increase of 107%,
- 29% overall increase in transfers to CSU and UC STEM programs; during the same time span the number of Hispanics transferring to CSU and UC STEM programs rose by 88%.

³ Partners include NASA's Jet Propulsion Laboratory, the City of Hope, Oak Crest Institute of Science, the Rancho Santa Ana Botanic Gardens, and three universities.

Over the past three years, 98% of the 96 students participating in Summer Research Experience (SRE) have already transferred or are on track to transfer. Data from CSU Fullerton show that our transfers who participated in SRE are much less likely to be on academic probation or experience the typical transfer GPA slump after their first semester.

Operation VETS (Veterans): One of the biggest issues facing combat veterans is social isolation. In 2009, Citrus College opened the Veterans Center which serves as a focal point for veterans to obtain their GI Bill benefits, socialize with other veterans, access computers, and study. In 2010 the College brainstormed on how to effectively collaborate to meet the needs of veteran students. As a result, our veterans now receive additional support services:

- *Peer mentors* — Carefully chosen veteran mentors assist other veteran students in the transitions associated with college and the work place. The main components include: role-modeling academic excellence, encouragement and friendship, and college survival skills coaching.
- *Math Supplemental Instruction* — Supplemental Instruction facilitators were strategically assigned to math courses where veterans were predominately enrolled. In addition, there are academic tutors available to assist veteran students with mathematics and other subjects.
- *Additional mental health services* — A quarter time mental health counselor devoted her time to veterans to increase outreach, awareness, offer workshops, and provide counseling. Additionally, the mental health counselor worked directly with the regional Veterans Center to ensure continuity of psychological services.
- *Transportation* — We provide transportation to Veterans Administration clinics/hospitals. This helped veterans access medical care for those with transportation needs.

Impact: For the two years preceding 2010, data showed that our veteran student population persisted at an average of 48%. Veteran enrollment was low in transfer-level mathematics (essential for veterans considering transferring) — since fall 2008 only 20 veteran students (5.3%) enrolled in statistics, 3 (0.8%) in college algebra, and 6 (1.6%) in pre-calculus.

Table II: Goals established for future success of veterans and subsequent goal achievement

Three-Year (2010-2013) Goals	Actual Results
Decrease the percent of veteran students on probation/dismissal from a baseline of 19%	Probation/dismissal rates decreased to 10%
Increase veteran student enrollment in transfer level mathematics from a baseline of 7%.	Enrollment increased to 27%
Increase veterans' persistence rate from baseline of 48%.	Persistence increased to 73%.

Table III: Lessons learned and responses from RACE to STEM and Operation VETS.

Program	Lesson/Response
RACE to STEM	Lessons Learned: 1) FIGs need a least a year to gain traction. Do not rush the process; ensure faculty have ownership of their learning. 2) Choose student research opportunity partners carefully to ensure program structure is consistent with best practices in the literature and that students receive high-quality mentoring that supports learning and retains them in STEM
Operation VETS	Major Lesson Learned: Do not offer winter session math preparation workshops; veterans do not enroll.

4. RECENT CHANGES

RACE to STEM

As stated earlier in this application, Citrus College has outlined the following goals for its RACE to STEM program:

1. Increase the number of STEM majors.
2. Increase the number of transfers to four-year institutions.
3. Increase the effectiveness of instruction, focusing especially on student-centered learning.
4. Provide real-world, experiential opportunities for learning science.
5. Develop a range of programs for middle and high school students in college feeder districts.
6. Strengthen and enhance academic support services.
7. Provide a streamlined, articulated pathway from basic skills to career /four-year college entry.
8. Organize and analyze data to drive informed decision-making.

Recent changes at the college have directly targeted these goals, with the following examples.

Increasing the effectiveness of STEM Instruction

Faculty members participating in the science FIG have been reading the literature focused on inquiry-based teaching and learning and discussing the viability of inquiry-based instruction for non-major biology classes at the community college level. To better understand how this approach might work at the local level, one faculty member taught a non-majors college biology class during the fall 2014 term utilizing an inquiry-based approach. Students in the experimental class learned all topics and content of the class through their semester-long investigation of high-lipid algae and its potential as a biofuel.

Consistent with the literature (e.g., Lord & Orkwiszewski, 2006), students in the experimental class at Citrus College asserted more positive attitudes about learning science. Faculty found students in that class section more engaged with the topics, more motivated to find meaningful approaches to conducting the experiments, and better able to analyze science problems than students in traditional classes taught by the same faculty member. Qualitative and quantitative data collected during the semester will be analyzed and included in the FIG group discussions. A second instructor has redesigned his class for the spring 2015 term allowing for a comparative sample and more robust discussion among faculty.

Previous studies have shown that inquiry-based teaching has a positive impact on student learning outcomes as compared to the more conventional “cookbook” method of lab instruction (Blank, 2000; Marbach-Ad & Sokolove, 2000; Lord & Orkwiszewski, 2006). Scholars assert that students who do not become involved in the lesson mentally tune out what is going on and passively await the end of class with their brains turned off (Lord, 1999) whereas with inquiry-based teaching and learning, students are more cognitively engaged (Enger & Yager, 2001). It is anticipated then, that non-STEM majors who participate in the inquiry-based classes will better engage and develop more robust analytic skills that transfer to other courses. Moreover, some students may consider changing from a non-STEM to a STEM major, a shift consistent with previous findings.

Strengthening and enhancing academic support services

A review of student outcome data each term provides ongoing opportunities to examine the effectiveness of STEM academic support services including Supplemental Instruction and SIGMA Peer Mentoring. Based on data analyses, changes to practices have been implemented in the past calendar year.

- Data from successive terms showed that Supplemental Instruction in certain science classes did not categorically improve student outcomes during winter and summer terms. Instead, students who did not attend SI did as well or better than those who did attend. Discussion with science faculty indicated that they believed better prepared students enrolled in these courses during the short winter and summer terms. Therefore, funds allocated to support courses where SI did not make a significant difference to student outcomes was reinvested to support additional sections of courses where data showed improved outcomes as a result of attendance. We anticipate that these changes will increase success rates in the mathematics classes now supported with SI that were not previously connected to SI.
- After collecting and analyzing student attendance and course outcome data for students participating in the SIGMA Peer Mentoring program, we determined that the one-to-one mentoring was not cost effective nor producing the anticipated results. Therefore, the peer mentors were retrained in spring 2014 to serve as study group facilitators for students enrolled in Trigonometry, Calculus, Physics, and Chemistry—courses not supported by SI. Study groups have been designed to provide opportunities for peer collaborative problem solving, a format shown to increase student mastery of the material and final grades (Duncan & Dick, 2010).

Provide real-world, experiential opportunities for learning science

Successes recorded from a small summer research experience program indicated expansion of the program would benefit our STEM students and desired completion and transfer outcomes (Lopatto, 2010). Therefore, we identified additional research sites (City of Hope, JPL, Chapman University) and developed new agreements. These new sites allowed the program to expand. They are especially important as there is strong potential for student placement beyond the life of the Title V grant funding as City of Hope and JPL have established and self-funded summer research programs. To ensure opportunities were available to Citrus College students at Chapman University, the college collaborated on writing a National Science Foundation REU grant proposal which was funded in March 2014. The renewable grant ensures Citrus College students will continue to participate in summer research at Chapman University.

Operation VETS (Veterans)

Our Operation VETS program has established the following goals to guide its future success:

1. Decrease the percent of veterans on probation/dismissal.
2. Increase the number of veterans accessing our college classrooms
3. Increase enrollment of veterans in transfer level mathematics.
4. Increase veteran students' persistence rate.
5. Help veterans overcome low academic skill barriers, particularly in math.
6. Provide additional mental health services.
7. Raise awareness among veterans about the college's programs, services, courses, and overall issues impacting veteran transition.

Like our RACE to STEM program, many of the recent changes at our college target these goals explicitly, such as the following.

Providing academic and emotional support for veterans

Citrus College was the first of five Southern California college campuses to add a Veterans Success on Campus (VSOC) program, a dedicated VA Rehabilitation Counselor funded by the Veterans Administration (July 2013). Just last March, the program was moved to a centrally located building to address the needs of our expanding veteran population. The new building

spans over 3,700 square foot space (triple the size of the original location) and was repurposed to meet the special needs of our veteran students, including those with physical disabilities. The new location houses a study area equipped with computers, confidential counseling offices, confidential space for eligibility certification, a lounge, a kitchen, a bathroom, and an outdoor quiet space providing an optimal opportunity for a holistic approach. This center was renamed the Veterans Success Center to reflect the successful outcomes of the program.

Citrus College also knew that those veterans often face severe psychological hurdles in their academics. Therefore, we modified and improved the Veteran Specific Transitional Course for College Success, (Counseling 161), by adding more information about post-traumatic stress disorder, traumatic brain injury (TBI), focusing on study skills specific for students with learning brain injuries and learning difficulties, other health issues, and how to cope with family transitional issues (not just college transitional issues).

Raising awareness

Community outreach and **industry networking** are now prominent features in our veterans program. The Citrus College Veterans Network (Student Veterans Club) volunteers at numerous community events, such as the Glendale YWCA Fashion Show, Helping Feed the Homeless Veterans in Los Angeles, and helped plant a meditation garden and helped to repurpose a home for Homeless Female Veterans in West Covina.

Furthermore, our veterans are now engaged with business leaders such as San Gabriel Valley Civic Alliance, Paragon Security Systems, Intercon Security, West Covina EDD office, Workforce Development, AMVETS, Seidner Collision Repair, Ottosen and Company, Volunteers of America, California Department of Corrections and other agencies for employment opportunities and resume writing workshops. Finally, under the sponsorship of the Veterans Administration, our college added a **work-study program** to its existing mentor program.

Recent outcome results

Such changes have netted highly positive results. As word got around about our college's support of veterans, enrollment of veterans increased to 533. Female veterans have been especially responsive. Female student veteran's enrollment has increased by 22.3%. The increase in the enrollment of female veterans is significantly higher than the national average, and their participation and in utilizing the Veterans Success Center has increased from 35% to 53% just in the last year alone.

5. FUTURE CHANGES

RACE to STEM

Citrus College has major plans in store to boost STEM learning even further, especially for students who are traditionally under-represented:

- *Counseling* – the grants have supported dedicated STEM counselors as part of the approach. With simultaneous attrition among the STEM counselors and hiring of additional SSSP counselors, we will focus on training the new SSSP counselors to better understand the unique needs of STEM students. This will enable STEM students to see any counselor and count on receiving up-to-date information on STEM pathways and transfer.
- *Summer Research* – to expand and institutionalize this component, we will continue to focus on leveraging pertinent partnerships. For example, we have just begun a conversation with the University Corporation for Atmospheric Research (UCAR) in Boulder, Colorado and are in the process of designing a program that would give our students opportunities to complete mini-research projects on the UCAR campus. We also hope to propose a new Research Experience for Undergraduates (REU) model to the National Science Foundation that would ensure we have the resources to support our students in their STEM research/internship experiences.
- *Completion coaches* — We are adding additional personnel who will serve as STEM completion coaches. These coaches will work with cohorts of students and help them to build critical non-academic skills necessary for successful completion of post-secondary education as well as ensure that students are connected to the institution and the social aspects of college.
- *Professional development* — Our college plans to formalize training for STEM student tutors and peer mentors. This may be using approaches consistent with AVID Higher Ed and/or implementation of the Treisman model for peer mentor/study group leaders.

Operation VETS (Veterans)

At Citrus College, we have major plans for our veterans as well. In 2015, we will provide them access to a **Collaborative Learning Community**, which will expand on the success of our existing Counseling 161 Veteran Specific Transitional Course for College Success and Learning Communities at Citrus College. Such classes will offer us the opportunity to develop a stronger network of relationships to help veteran students achieve their full potential as learners and successfully accomplish their educational goals. For example, this plan will link Counseling 161, math, English and history as the first learning community pilot program for veterans.

Mentoring will play an increased role in the coming years in our programs. Future **Faculty Mentorships** will connect veterans with faculty members interested in mentoring student veterans. For female veterans, we will provide **Female Leadership Luncheons** (Women Warriors Leadership Project) to offer female veterans the opportunity to network and connect with successful female leaders in various industries.

Many of our future support structures center on health, especially behavioral/social counseling and mental health. In 2015, our college will pilot a Tele-Medicine/Health-Connect for Veterans in collaboration with the Veterans Administration (VA). The VA has been exploring opportunities for Tele-Medicine saving the veteran time and travel to the nearest VA hospital for follow up visits. We will soon be adding Wilderness Therapy family groups and communication building skills to assist veterans and their family's transition to college and civilian life. We will also offer stipends and training for veterans with traumatic brain injury and PTSD to purchase and use Livescribe SmartPens, which sync audio recordings with any markings on special paper,

allowing students to go back and touch those images or words on the paper and playback what was said when they were created, right on the pen itself.

Citrus College is also committed to providing students with disabilities an accessible educational environment that allows each student the opportunity to reach his/her academic goals and participate in a full range of campus programs and activities. Our **Disabled Student Programs & Services (DSPS)** program will provide support services to compensate disability-related educational limitations. Such support services are essential components of the educational program because they help disabled students realize their educational potential in the mainstreamed academic programs.

In terms of academic support, Citrus College will soon establish **reentry math workshops** to assist veterans in successfully completing their transfer-level math courses, as well as increase the number and availability of veteran-specific scholarships.

6. FINANCIAL IMPACT

Perhaps the most telling facts about the financial impact of Citrus College's programs are the costs associated with educating our students enrolled in these programs.

RACE to STEM

Citrus College invests roughly \$850,000 each year in its RACE to STEM program, equivalent to \$425 for each of the 2,000 students majoring in a STEM subject area, a relatively small amount given the tremendous impact our STEM programs have had and continue to have on student success. Of our major STEM programs, our Summer Research Experience, Supplemental Instruction, and counseling programs have the largest financial impact, each ranging in annual costs between \$115,000 and \$150,000. On the other hand, our SIGMA program has little financial impact, costing only roughly \$4,500 each year.

Operation VETS (Veterans)

Currently, around \$314,000 is invested annually in the veterans program (533 students) at an average cost of \$589 per student. Once again, this amount is relatively small given the tremendous impact it has made and continues to have on veteran student success.

As a community college we are unable to track the entire cost to award a bachelor's degree. Nonetheless, the STEM and Veterans programs demonstrate cost-effectiveness and replicability that can be implemented at other California institutions of higher education.

7. RISKS AND TRADEOFFS

RACE to STEM

Most of the STEM programs offered by Citrus College have overwhelmingly benefited the college and our students. However, we can anticipate a few difficulties arising:

- As we make changes to which classes are paired with Supplemental Instruction (SI), we recognize that although the changes have been based on data, we have been unable to account for all variables. For example, data indicated that SI was not impacting student outcomes for BIO 105 during winter and summer terms. However, the data were from several terms with the same slate of instructors. As different instructors are assigned to teach BIO 105 during those terms, we may see different outcomes (e.g., less experienced adjuncts may not have the same outcomes as the more experienced tenured faculty). We will continue to review data from classes where SI has been discontinued to be sure the move was prudent.
- We believe dedicated STEM counseling has significantly contributed to increasing the number of STEM transfers. As we transition to generalist counselors who receive some training but who serve all majors, we may lose some of the benefits seen with STEM-only counselors. We will carefully watch transfer numbers and listen to student feedback.
- While the literature asserts that the completion coaches will positively impact student persistence, completion and transfer outcomes, this is a new approach to Citrus College. Therefore, we will collect and analyze relevant formative data in order to evaluate both implementation and success.

Operation VETS (Veterans)

Much like the programs implemented by the RACE to STEM project, our projects for veterans have largely been a win-win situation. This does not mean our college has not or will not experience its share of difficulties:

- Implementing a math preparation workshop may present difficulty in recruiting attendance; this concern will be addressed with preparatory classes being offered during days that have fewer classes scheduled (such as Fridays), or by providing an interest survey to uncover the optimum days and times available.
- Providing learning community courses specific for veterans can present issues with offering the wrong level of courses based on the veteran's needs and or placement, such as math or English.

SUSTAINABILITY

8. KEY STRENGTHS AND ASSETS

RACE to STEM

In September of 2011, Citrus College secured Title V funding to strengthen and enhance academic and student services to address declining outcomes in minority student success in STEM pathways. Largely as a result of its Title V program (currently in its final year), our STEM program is evolving into a multi-faceted and sustained program that offers examples of how to increase participation, persistence, and transfer in STEM through a cohort model.

Significant contributions of administrative time have been allocated by our college independently of external funding. Our college and our partners have been able to actualize RACE to STEM largely because the college already has many resources in place within its institutional initiatives, its partnerships with agencies, industry, four-year universities, and K-12 school districts.

One goal of our college is to meet the needs of its community by enhancing partnerships with schools, colleges, universities, businesses, and community-based organizations. It is through these collaborative efforts that we can rapidly respond to the changing workforce training and economic development needs of our community. Therefore, to sustain its STEM programs, we have reached out to our partnering institutions to secure long-term commitments to student STEM success by:

- co-authoring in 2014 a NSF Research Experience for Undergraduate grant with Chapman University to ensure 5-6 Summer Research Experience opportunities each year;
- developing relationships and memoranda of understanding with Oak Crest Institute of Science and Rancho Santa Ana Botanic Garden to provide students with internship/research experience;
- partnering with the City of Hope cancer research hospital to place students in its summer research program; and
- building relationships with scientists at Jet Propulsion Laboratory who have, in turn, identified Citrus College as the go to school for student interns as future grants are funded.

To sustain strategies post-grant through a distributive leadership model that maximizes funding for students, and demonstrates the college's institutional commitment, three of our academic deans have continually participated in program implementation and oversight. These deans have a history as career educators at Citrus College and have been involved with the STEM Academy since the planning phases, therefore, increasing the likelihood of consistency in implementing the program.

Operation VETS (Veterans)

The goal of our Student Veteran Network is to form a social network between veteran students and their friends, family, and supporters to help ease the transition for veteran students. Each year, the Network appoints a Veteran Student Ambassador, who (among other duties) serves as a liaison between the faculty/administration and veteran students.

In addition, we have developed a number of programs designed to instill long-term sustainability in its programs to offer academic opportunities to under-served populations.

- To strengthen its mental health services by implementing an aggressive mental health counseling outreach program specifically for veterans, Citrus College collaborates with the student health center, the Veterans Success Center, and the East Los Angeles Veterans Center. We plan to further strengthen the Veterans Club & Veterans Success Center by expanding this collaborative process and implementation among a variety of our academic departments to support the Veterans Success Center and Club. Our college will absorb all

costs related to supporting the Veterans Success Center and Club and continue campus-wide collaboration among relevant departments.

- Citrus College has established an Operations VETS Support Team comprising representatives from Admissions and Records, Outreach, Financial Aid, Academic Counseling, Mental Health & Health Services, Career Services, Disability Services, and Student Affairs. This team convenes twice a semester to ensure that services are coordinated effectively to better serve veteran students. We plan to maintain the Operations VETS Support Team permanently.

The following detail specific partnerships secured for each of the two foci (RACE to STEM and Operations VETS) of this application.

California State University, Fullerton (CSUF)

To increase transfer options and retain students in STEM, our college has partnered with CSU Fullerton for the past six years to increase transfer pathways. Through this partnership, CSU Fullerton has provided our students with a transfer coach, STEM counselors, peer mentors, and summer research opportunities. Upon transfer to CSUF, students are supported by the STEM transfer project and receive priority registration. Without this partnership, many of our students who want to attend CSU Fullerton would not be eligible, due to out-of-area GPA requirements.

Veterans Administration Long Beach, CA

The major VA Hospital for the Greater Los Angeles area is located in Long Beach. The Long Beach VA brings a Combat Care unit to our campus, connects student veterans with mental health care services, and advocates for student veterans on a wide range of salient issues.

9. STRATEGIES FOR ENGAGING STAKEHOLDERS

RACE to STEM

RACE to STEM employs a continuous collaboration model among its faculty and administrators to ensure compliance of operational policies and procedures. Regular collaboration also provides monitoring and mechanisms to ensure quality and regular communications feedback. The collaboration schedule is shown in Table IV.

Table IV: Collaboration schedule for RACE to STEM.

What	When	Who	Why
STEM staff meetings	Bi-weekly	Project staff; other Citrus College staff	On-going status updates, problem solving, and communications
Progress reports	Monthly	Project Director; Lead Deans; Advisory Committee	Document progress in achieving objectives for monitoring and modifications; document program compliance and payroll
Quarterly summaries	Quarterly	Project Director; Lead Deans; Advisory Committee	Summarize quarterly progress; analyze and disaggregate data
Annual performance reports	Annually	Project Director; Advisory Committee; Board	Document substantial progress to Board
Website; special newsletters to community and K-12 partners	Monthly	Project Director; Lead Deans	Minutes posted; pilot projects and evaluation outcomes shared
Collaboration Council	Bi-annually	Project Director; CSUF Project Manager; Deans	Assess progress to goals; problem solve

Operation VETS

Operation VETS maintains a similar strategy for engaging stakeholders. Our Student Veteran Network forms a social network between veteran students and their friends, family, and supporters to help ease the transition for veteran students. As noted, each year the Network appoints a Veteran Student Ambassador, who (among other duties) serves as a liaison between our faculty/administration and our veterans. Other engagement strategies include:

- Our veterans engage with business leaders such as the San Gabriel Valley Civic Alliance, Paragon Security Systems, Intercon Security, West Covina EDD office, Workforce Development, AMVETS, Seidner Collision Repair, Ottosen and Company, Volunteers of America, (VOA), California Department of Corrections and other agencies for employment opportunities and resume writing workshops.
- Citrus Colleges' Veterans Network volunteers at numerous community events such as the Glendale YWCA Fashion Show, Helping Feed the Homeless Veterans in Los Angeles, Helping to plant a meditation garden and help repurpose a house to be used for homeless Female Veterans in West Covina.

10. SUSTAINABILITY OF CHANGES

Citrus College has a longstanding experience in sustaining programs originally funded through grants long after grant funding has ceased. As one example, the federal Fund for the Improvement of Postsecondary Education (FIPSE) grant funding for the Veterans Center ended in 2013. However, the Veterans Success Center has remained open and all of the services (e.g., peer mentoring, GI Bill Benefits services, mental health counseling, and supplemental instruction in math) that the Center originally provided continue to remain available.

As a result, success has continued to strengthen among veteran students. The college has and will continue to sustain all of the institutional resources it provided before the FIPSE grant and all of the strategies as a result of the FIPSE grant.

In terms of STEM, Citrus College is also currently implementing sustainability plans for its Faculty Inquiry Groups and student research opportunities such that if external funding ceases the college will continue to implement these highly effective STEM strategies. Learning Communities have already been fully sustained for over a year now.

Citrus College is adept at strategically designing sustainability into projects and spending award funds wisely to ensure student success; the college has used this seed money to sustain activities that data demonstrate clearly boosts student success.

With the economic collapse in 2008 and the state budget crisis, Citrus College took the initiative to amplify its efforts to receive external funding. The college continually applies for external funding for needs based on data and features a high success rate. In other words, Citrus College faculty, administrators, and staff are effective stewards of taxpayer money, know how to implement effectively, and sustain efforts. If given the opportunity, the Award for Innovation in Higher Education is another opportunity for Citrus College to demonstrate that it will ensure that the grantor, the California Department of Finance, will receive a significant return on its investment in the form of student success.

EVALUATION

11. EVALUATION METHODS

Solid evaluation techniques are essential for effective implementation of continued innovative strategies. To achieve this aim, Citrus College plans to continue to leverage the services of its Director of Institutional Research, Planning, and Effectiveness, Lan Hao, Ph.D. If necessary, Citrus College plans to use any award monies it receives to fund this commitment to implement a rigorous evaluation plan. This plan will generate multiple outcomes that correlate to the decision-making process, including:

- planning decisions, which influence selection of institutional goals and objectives;
- structuring decisions, which ascertain optimal strategies and procedural designs for achieving the objectives that have been derived from planning decisions;
- implementation decisions, which afford means for carrying out and improving strategies; and
- feedback decisions, which determine whether to continue or modify existing objectives.

An independent third party evaluator will coordinate with the Office of Institutional Research of Citrus College to design the Evaluation Plan. This evaluator will ensure a tight adherence to scientifically valid education evaluation methods. (See the following table.)

Table V: Evaluation plan for Citrus College, with the left-side column listing the Institute of Education Sciences IES (2002) protocols for a scientifically valid education evaluation and the right column indicating the method in which Citrus College plans to meet each protocol.

IES Protocol	Method
(A) Adheres to the highest possible standards of quality with respect to research design and statistical analysis.	A third party evaluation, designed and conducted by professionals independent from the staff and faculty implementing the project.
(B) Adequately describes the programs evaluated and, to the extent possible, examines the relationship between program implementation and program impacts.	Comprehensive analysis of output and outcomes data, rather than simply publishing and distributing data. Appropriate decision-makers and stakeholders will be involved in making action plans based upon the results of the evaluation analysis.
(C) Provides analysis of achievements by the program with respect to its projected effects.	
(D) Employs experimental designs using random assignment, when feasible, and other research methodologies that allow for the strongest possible causal inferences when random assignment is not feasible.	Use of control groups for comparison (sections of courses not using new methods; success of students in parallel courses of study whose faculty are not involved in development activities; historical longitudinal studies)
(E) May study the implementation of the program by combining scientifically valid and reliable methods	Surveys, focus groups, questionnaires will be used in addition to tracking/analyzing student outcomes

Data collection procedures will include gathering relevant data from sources already existing in the college such as the Office of Institutional Research, Technology and Computer Services, Admissions Office, Assessment Office, Veteran Success Center, STEM Academy, and the

Office of Financial Aid; establishing processes to gather new information and data relevant to project assessment; developing surveys or other instruments.

12. TARGET OUTCOMES

RACE to STEM

Target outcomes for the STEM Academy are tabulated in Table VI.

Table VI: Target outcomes for the success of the RACE to STEM project as a result

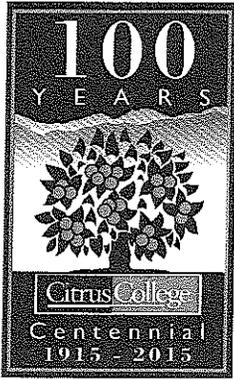
2015-2016	2016-2017	2017-2018	2018-2019
Outcome: STEM students attend regular counseling appointments and have comprehensive and up-to-date STEM-specific Student Educational Plans Baseline: 500			
600	675	775	900
Outcome: Funding is secured through alternate sources (e.g., REU grants, partnerships) that sustain the summer research experience program with one additional project or cooperative agreement being added annually Baseline: 1			
1	2	3	4
Outcome: Increase by 50% the percentage of students who participate in a summer research experience or other STEM internship Baseline: 40			
45	50	55	60
Outcome: Increase the number of at-risk STEM students who are members of cohorts guided by completion coaches Baseline: 0 (new program)			
50	150	200	250
Outcome: Increase the number of students participating regularly (5+ sessions per semester) in SIGMA Facilitated Study Group Sessions Baseline: 40			
100	150	200	250
Outcome: Increase the percentage of first-time, STEM majors who transfer to a STEM discipline Baseline: 10%			
12%	15%	17%	20%

Operation VETS (Veterans)

Target outcomes for the Veterans Success Center are tabulated in Table VII.

Table VII: Target outcomes for our veterans.

2015-2016	2016-2017	2017-2018	2018-2019
Outcome: Decrease the percent of veteran students on disciplinary probation/dismissal to 5%. Baseline: 10%			
8%	7%	6%	5%
Outcome: Increase veteran student enrollment in transfer level mathematics to 50%. Baseline: 27%			
32.70%	38.50%	44.25%	50.00%
Outcome: Increase veterans' persistence rate to 85%. Baseline: 70%			
73.75%	77.50%	81.25%	85.00%
Outcome: Increase the number of veteran students who declare STEM majors as measured by applications to the STEM Academy. Baseline: 10%			
12%	15%	18%	20%



January 9, 2015

California Department of Finance
 Education Systems Unit - Innovation Awards
 915 "L" Street, 7th Floor
 Sacramento, CA 95814

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Dr. Geraldine M. Perri
 Superintendent/President

Dear Innovation Awards Committee:

It is with great pleasure and enthusiasm that Citrus College, a proud Minority-Serving Institution with a strong record of student success, applies for the California Department of Finance Innovation Awards. As the Superintendent/President of Citrus College, I wholeheartedly support this application.

Though Citrus College implements many innovative programs it could highlight in this application, the college's Innovation Awards Team, comprised of various campus constituencies, focused on two key areas for this application: STEM (Science, Technology, Engineering, and Mathematics) and the Veterans Success Center. The goals of these programs are aligned with the priorities of the Awards for Innovation in Higher Education. They have a strong record of producing student success, especially for under-represented students, and are replicable and cost-effective strategies that can be implemented at colleges and universities across our great state.

As a "College of Completion," innovation is clearly a priority for Citrus College, and our students have greatly benefited by our innovative STEM and Veteran programs.

Thank you very much for this opportunity.

Sincerely,

Geraldine M. Perri, Ph.D.
 Superintendent/President

Question 3: Impact of Policies, Practices, or Systems

For an authentic student perspective visit:

Veterans Program

https://www.youtube.com/watch?v=FHAc_V-6nnY
Students of Citrus College share their stories from military service, war, and what the Veterans Center at their school offers for returning veterans.



STEM, Summer Research Experience

<http://www.citruscollege.edu/stem/summerresearch/Pages/defaults.aspx>



Participants in the Summer Research Experience will gain a firsthand experience in scientific investigation in a dynamic, collaborative research environment. Students will get support from their partner institutions and will create a research poster they will present at one or more research symposiums. These experiences are paid and require a full-time commitment.

<https://www.youtube.com/watch?v=4dfIVLJA9bk>
The 2013 Summer Research Experience, held at Cal State University Fullerton as part of a partnership with three community colleges, including Citrus College. It is an 8-week program that partners community college students with faculty at CSU Fullerton to perform research in the STEM field.

