

2015-2018 CSUPERB Strategic Plan



About CSUPERB: The California State University Program for Education and Research in Biotechnology

CSUPERB believes that the best way to recruit, engage, and help students persist in life science careers is to provide access to experiential learning opportunities in biotechnology research and entrepreneurship. CSUPERB recognizes that modern biotechnology preparation requires the integration of multi-disciplinary coursework, hands-on practice and collaborative, team-based projects. We know that these experiences are particularly effective at engaging and retaining students who are the first in their families to attend college or are from communities underrepresented in the life sciences. By working with CSU faculty scholars on solutions for real-world problems in the classroom and on research teams, all students can build a solid foundation for successful life science careers. CSUPERB can best serve the evolving life sciences industry and California's regional economies by partnering with industry professionals, experts and organizations. CSUPERB knows that the California State University plays a critical role in California's biotechnology industry by providing not only a professional workforce but also innovative ideas that drive the growth and evolution of the industry.

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<http://www.calstate.edu/csUPERB>

Approved by Chancellor White, April 17, 2015



Executive Summary

**Expand Experiential
Biotechnology
Learning
Opportunities,
Innovate
Biotechnology
Education, and
Partner with Industry**

CSUPERB Grant Funding:
www.calstate.edu/csuperb/grant-abstracts/author.shtml

CSUPERB Events:
www.csuperb.org/symposium

CSUPERB Entrepreneurship:
www.csuperb.org/csuiicorps
 (@csu_icorps)

CSU Biotechnology Industry-Relevant Programs:
www.csuperb.org/biocompass

CSUPERB Student Outreach:
www.facebook.com/csuperb

CSUPERB Faculty Community:
www.linkedin.com/groups?home=&gid=2073023

In Fall 2014 the CSUPERB Presidents' Commission, Strategic Planning Council (SPC) and Faculty Consensus Group (FCG) agreed to develop a new three-year strategic plan for 2015-2018. Since 2009, CSUPERB has used three-year strategic plans to set direction, develop programming, and adapt annual operational plans.

The four main elements of the strategic planning process were:

1. A FCG Meeting (August 2014) to analyze campus needs;
2. CSU biotechnology faculty and student surveys (October 2014) to gather individual input;
3. A facilitated, two-day SPC Retreat (November 2014) to synthesize the feedback and industry trends; and
4. A Presidents' Commission Meeting (January 26, 2014) to review and respond to a 2015-2018 strategic plan draft produced by a SPC subcommittee.

The CSUPERB leadership committees decided the program should continue to operate under the current mission, vision and three broad strategies: **Expand Experiential Biotechnology Learning Opportunities, Innovate Biotechnology Education, and Partner with Industry.**

Priorities were identified for each strategic area. For instance, CSUPERB will increase programming around entrepreneurship education and the building of effective partnerships.

Despite a 27-year history, CSUPERB leadership committees decided the program is best characterized as an "Enterprising Nonprofit." (1) We remain focused on having **impact** on biotechnology student success. Student success is defined as persistence to a biotechnology-relevant degree, but also the acquired abilities to build a life science career. The latter is increasingly tied to the need to integrate or "make sense" of disparate, multi-disciplinary sources of knowledge or content. Threats to an organization like CSUPERB at this stage are diffusion, burnout, over-promising and underinvestment (1). CSUPERB's impact will depend on **collaborative partnerships**, alumni networks, faculty volunteerism and campus engagement. Over the next 3 years, we will work to make the CSU biotechnology community more **porous** by being engaged with and open to new ways of thinking within the university and the surrounding life science industry.



CSUPERB Mission, Vision & History

CSUPERB was organized between 1985 and 1987 by faculty across the CSU and led by Joe Bragin (CSU Los Angeles, Chair, Governing Board and Executive Committee), Steve Dahms (SDSU, Co-Director), and Crellin Pauling (SFSU, Co-Director). President Day (San Diego State University) championed the organization and in 1987 CSU Chancellor Reynolds officially approved and chartered CSUPERB. During this time, CSUPERB focused on acquiring resources and equipment necessary to incorporate molecular biology and genetic engineering techniques and concepts into the CSU curriculum and research laboratories. In 1988 a travel grant program was established and CSUPERB began hosting annual biotechnology symposia.

More than 80% of the 300,000 professionals working in the California life sciences industry have an education at or below the master's degree level (2). In 1999 the program's impact was recognized by the state with a special legislative line item (AB 968, Ducheny) to "maintain and enhance its role in the preparation of the biotechnology workforce." This increased financial support allowed CSUPERB to broaden its focus and create additional grant programs. At the same time program governance was organized around a Presidents' Commission (PC), a Strategic Planning Council (SPC), and a Faculty Consensus Group (FCG). A Program Operations Committee, including the Executive Director, program staff, SPC Chairs, and taskforce chairs, manages and administers program operations.

Between 1999 and 2004 the SPC developed a set of strategic goals and objectives. The 2004 Goals and Objectives document outlined areas of potential interest to CSUPERB, including education, research, faculty development, industry/government relations, and communications. In 2008

(continued)

Vision

CSUPERB will position the CSU as the premier source of biotechnology professionals for California and the global economy.

Mission

CSUPERB's mission is to develop a professional biotechnology workforce by mobilizing and supporting collaborative CSU student and faculty research, innovating educational practices, and partnering with the life science industry.

CSUPERB developed its first three-year (2009-2012) strategic plan, subsequently approved by Chancellor Reed.

Based on the 2009 and 2012 strategic plans, CSUPERB partnered with biotechnology employers and industry associations on curriculum and workforce development projects. CSUPERB provided initial support, bolstered by significant funding from the Alfred P. Sloan Foundation, for the development of biotechnology-related Professional Science Master's (PSM) degree programs. There are now 13 biotechnology-focused PSM programs across the CSU. A 2009 Small Business Administration grant to CSUPERB, together with Chancellor's Office support, led to the development of new online extended education courses and a website that collates and curates industry-relevant CSU courses and programs. CSUPERB served as a catalyst to make California Institute for Regenerative Medicine (CIRM) funding available to CSU students interested in stem cell research. Fourteen CSU campuses now have Bridges to Stem Cell Research programs that have received over \$56 million in CIRM funding as of 2015. CSUPERB mobilized public-private partnerships aimed at increasing the number of clinical laboratory scientists and other skilled professionals in California; two CSU-led teams won 2010 federal Department of Labor funding to support this effort. The CSUPERB

community contributed data and insights that led to major funding to the CSU from The Leona M. and Harry B. Helmsley Trust for STEM Collaboratives and the National Institutes of Health BUILD program in 2014. Also in 2014, CSUPERB won a National Science Foundation grant to establish the CSU Innovation Corps (I-Corps™) to offer experiential entrepreneurship education to faculty and student researchers system-wide. To define strategies, priorities and tactics for each of these projects, CSUPERB partnered across academic divisions and with multiple campuses, industry advisors and advocates. These partnerships and collaborations enhanced our ability to serve both California's students and the life science industry.

Since 2008 CSUPERB has studied and reported on the impacts of its grants and awards programs. CSUPERB has supported more than 500 CSU students and faculty annually since 2009. The applicant pool has continued to expand across campuses, disciplines and the faculty. 40% of grant applicants each year since 2009 were first-time applicants. The major grant programs averaged 12-fold returns (or 1270%), based on CSUPERB dollars awarded in the eight academic years (2004-2012) compared to follow-on funding received by CSUPERB-supported faculty. These data strongly suggest our coordinated seed grant investments, coupled with a competitive peer review system, are effective. Final reports from students

supported by CSUPERB highlight even greater, transformative impacts. The graduation rates of CSUPERB-supported students is greater than 91%, roughly double the averaged CSU STEM six-year graduation rates (3). Importantly the same proportion of CSUPERB-supported students (~90%) continue in life science career paths, whether accepting jobs in the life science industry or entering professional, graduate or medical school programs.

CSUPERB continues to mature and evolve with the dynamic, cutting-edge sector it serves. The SPC and the Presidents' Commission recognize the strategic value of system-wide, multi-disciplinary faculty participation in CSUPERB. CSUPERB's leadership councils, the FCG and SPC, provide feedback and direction on issues impacting biotechnology education and research at CSU universities. CSUPERB's network of external partners changes as companies develop and as new biotechnologies evolve. The 2015-2018 strategic plan is crafted to ensure an agile, responsive program supporting excellence in biotechnology education and research.

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2015-2018 Goals and Strategies

The 2015-2018 CSUPERB strategic plan identifies three priorities for the program: 1) expand experiential biotechnology learning opportunities across the CSU; 2) innovate biotechnology education; and 3) partner with the life science industry.

To address these priorities simultaneously over the next three years, CSUPERB will need support, advocacy and resources from the CSU, external partners and policy makers.

At this stage of CSUPERB's development (1), we think capacity-building activities should include expanded efforts to track student career trajectories, provide support for faculty leadership development opportunities, develop intentional influence strategies (4) to emphasize the impact of high-impact practices on student learning, and measure CSUPERB program impacts on student success. CSUPERB must pay continued attention to collaborations, communications and outreach to CSU administrators, faculty, students and alumni to align our efforts with the overall strategic directions of this

great public higher education system.

Strategic Goal #1: Expand Experiential Biotechnology Learning Opportunities

Based on feedback from life science industry employers (5) and graduate school admissions advisors, CSUPERB will prioritize its investments in multi-disciplinary, team-based experiential learning opportunities. Research opportunities, project-based internships, and evidence-based entrepreneurship programs allow students not only access to cutting-edge science and technology, but also opportunities to think like scientists, engineers and entrepreneurs. These student research experiences – whether in campus laboratories, companies, innovation centers or classrooms – create opportunities to explore and discover, knit together multi-disciplinary concepts, collect disparate data for evidence-based investigation, and synthesize and communicate findings. These are critically important modes of learning required to prepare for biotechnology industry careers (5).

Financial support for experiential learning experiences is particularly

impactful for at-risk students not supported by other training or scholarship programs. CSUPERB seed grants provide faculty with the resources to successfully compete for follow-on, externally funded grants. External grant support for CSU biotechnology faculty increases the number of students involved in faculty-led scholarship and research programs in classrooms, laboratories and in the field.

During these next 3 years, CSUPERB will place increased emphasis on improving faculty grantsmanship and building internal partnerships (intra-campus, across divisions, and inter-campus) to expand experiential learning for all CSU biotechnology students.

Strategic Goal #2: Innovate Biotechnology Education

The CSU has a strong record of preparing and graduating students into jobs, graduate and medical school programs. Our alumni provide the high-level talent for basic discovery programs and clinical research in the biotechnology industry. However, the biotechnology industry overall does not reflect California's demographics; many of our communities remain

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CSUPERB knows that research and experiential learning opportunities are proven high-impact practices (6) that engage all students and teach them skills needed to persist toward STEM degrees (7). During this next 3-year period, CSUPERB stakeholders want the program to work to increase adoption of experiential learning and course-based research at all levels of biotechnology-related curriculum.

To do this we will encourage cross-divisional and cross-disciplinary collaborations. Biotechnology advances today depend on experts from many fields working on multi-disciplinary teams, bringing together life, physical, clinical, computer sciences, business, engineering, public health and mathematics (5). We also know graduates aiming for careers in commercial, product-focused companies need to understand the regulatory and milestone-

based environment in which they will work (5). Recognizing that there is more to meeting the needs of current learners than merely introducing experiential learning, CSUPERB stakeholders prioritize interdisciplinary and cross-divisional curriculum development that also incorporates practical skill building for our students.

Strategic Goal #3: Partner with the Life Science Industry

CSU biotechnology faculty and students report increased interest in learning from and working with entrepreneurs, communities, small business development centers, regional innovation hubs, and companies to learn how to “translate science into something tangible.” (5) On the academic side, we need to find ways to make campuses more porous and open to external partnerships with other universities, companies, and communities. To this end there is keen interest in recruiting CSU alumni to serve as mentors, advisors and partners in entrepreneurship education and research efforts. Our stakeholders recognize that industry professionals can be particularly effective partners in building awareness of biotechnology-relevant product development, describing skills needed in today's workforce, and helping to develop courses, like project management and regulatory affairs, for our students.

Success Indicators

- Increased numbers of CSU students and faculty involved in biotechnology research, discovery

and evidence-based entrepreneurship

- Increased availability of multi-disciplinary biotechnology courses across the CSU, especially those that integrate course-based research projects
- Increased number of seminars and workshops to bring multi-disciplinary groups together, with a special emphasis on entrepreneurship education and biotechnology commercialization
- Increased industry and alumni participation at the Annual Biotechnology Symposium, in entrepreneurship programs, and as part of curriculum development efforts
- Continue with timely reporting, including annual reports, impact reporting (student outcomes, follow-on funding, etc.) and workforce demand data
- Increased number of press releases and/or press coverage for CSUPERB activities and participants, along with greater connection and engagement of CSU faculty, students and alumni at CSUPERB's social networking sites
- Board level involvement of CSUPERB leadership with biotechnology industry associations

References Cited

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December 2014 at:

<https://nonprofitquarterly.org/management/28-the-spiral-of-sustainable-excellence.html>

- (2) California Life Science Report (2014). Available online (1/12/14, <http://www.califescience.org/>; Peters & Slotterbeck, "Under the Microscope: Biotechnology Jobs in California." Available February 2015 at: <http://www.calmis.ca.gov/file/occmisc/Biotech-Part3.pdf>
- (3) The average 6-year graduation rate for students entering the CSU system with a declared STEM major at entry from 2003-2007 was 51%, with 35% obtaining a STEM degree and 16% obtaining a non-STEM degree. This 51% graduation rate is almost identical to the "non-STEM at entry" student population.
- (4) Celep, A. & Brenner, S. (2014) Integrating Intentional Influence into Your Strategy. Stanford Social Innovation Review. Available February 2015 at: http://www.ssireview.org/intentional_influence/entry/integrating_intentional_influence_into_your_strategy
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- (6) High-Impact Educational Practices: A Brief Overview. George D. Kuh (AAC&U, 2008). Available online (12/2015): <https://www.aacu.org/leap/hips>
- (7) Graham MJ, Frederick J, Byars-Winston A, Hunter A-B, Handelsman J (2013) Increasing Persistence of College Students in STEM. *Science* 341: 1455.
- (8) O'Donovan, D. & Flower, N.R. (2013) The Strategic Plan is Dead. Long Live Strategy. Stanford Social Innovation Review. Available February 2015 at: http://www.ssireview.org/blog/entry/the_strategic_plan_is_dead_long_live_strategy

Photos

Page 1: CSU Fresno professor & 2008 CSUPERB Andreoli Awardee Alejandro Calderón-Urrea with his research group at the 25th Annual Biotechnology Symposium.

Page 2: The first CSU Innovation Corps (I-Corps™) student team cohort of at the 27th Annual Biotechnology Symposium.

Page 3: CSU Monterey Bay professor Aparna Sreenivasan and her research group provided the beautiful image for the 24th Annual CSU Symposium and the CSUPERB blog. The image is of *Anabaena flos-aquae* and *Anabaena circinalis* in environmental samples collected at Pinto Lake in Watsonville, California.

Page 5: Samantha Kubeck, Quality Assurance (QA) Supervisor at Nodality & a San Francisco State University Professional Science Masters graduate, hosted the QA roundtable at the Career Networking Session for students at the 27th Annual Biotechnology Symposium.

Page 6: CSU Dominguez Hills student researchers talk with industry professionals, Gary Fujii (CEO, Molecular GPS Technologies) and Carolyn Siegal (formerly President, Janus Pharmaceuticals, and now Siegal Consulting) about business development and licensing at the 25th Annual Biotechnology Symposium.

2015-2018 CSUPERB Cascade of Strategic Choices

[from O'Donovan & Flower (8)]

