



A Strategic Plan for the California State University Program for Education and Research in Biotechnology (CSUPERB) – AY 2009-2012

Approved: January 22, 2009, Chancellor Charles B. Reed

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 responding to and anticipating the needs of the life science industry.

CSUPERB will:

- Expand and provide access to biotechnology research opportunities in the CSU;
- Innovate and disseminate educational practices to close the gap between CSU-based learning and biotechnology industry practice;
- Strengthen understanding of the critical role the CSU plays in California's biotechnology industry;
- Advise California policy makers and the public on new advances in biotechnology research and education.

What We Believe

CSUPERB recognizes that modern biotechnology preparation requires the integration of coursework, hands-on practice and participation in multi-disciplinary, team-based research projects. CSUPERB believes that the best way to engage, recruit and retain students in life science industry careers is to provide access to and opportunities in real-world biotechnology research settings. 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 in the classroom and on basic and applied research problems, students build a solid foundation for successful life science industry careers. CSUPERB knows that the CSU plays a critical role in California's biotechnology industry success by providing not only a professional, entrepreneurial workforce but also the innovative ideas that drive the growth and evolution of the industry. CSUPERB can best serve the evolving life sciences industry by reaching out and partnering with external advisors to stay informed of and responsive to its needs.

I. Introduction

The life science companies, academic centers and non-profit research institutions that make up the biotechnology, or life sciences, industry in California generated more than \$70 billion in revenues during 2007 and employed over 260,000 professionals in the state (1). This skilled workforce makes fundamental scientific discoveries and develops new products that impact human health and nutrition – from drugs for treating diabetes to devices for repairing heart damage to diagnostics for detecting food contaminants. Universities play an inextricable and critical role in the success of the life sciences industry. California's universities provide not only an available, highly skilled, entrepreneurial workforce, but also the new knowledge and innovative ideas that drive the growth and evolution of the biotechnology industry.

Increasingly, the biotechnology industry is urging universities to integrate applied research experiences into academic programs to provide students with the skills to solve real-world problems and develop innovative solutions. The California State University Program for Education and Research in Biotechnology (CSUPERB) recognizes that modern biotechnology preparation requires integration of coursework, hands-on practice, and student participation in multi-disciplinary, team-based research projects. CSUPERB is committed to reducing the gap between biotechnology education and industry practice to help build and maintain a professional workforce and anticipate the needs of this evolving field. CSUPERB has now developed a mission-focused, strategic system-level plan to meet the workforce needs of the biotechnology industry in California and the world.

II. Program History

CSUPERB was organized between 1985 and 1987 by faculty from across the CSU led by Steve Dahms (SDSU, Co-Director), Crellin Pauling (SFSU, Co-Director), and Joe Bragin (Cal State LA, Chair, Governing Board and Executive Committee). President Day (San Diego State University) championed the organization and in 1987 CSU Chancellor Reynolds officially approved and chartered CSUPERB. The CSUPERB Governing Board, made up of faculty from all CSU universities, acted on policy recommendations brought forward by its Executive Committee. Between 1987 and 1999 program governance was faculty-driven with loose reporting requirements to the SDSU President and Dean of Science. 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. A travel grants program was also established to provide funds for faculty and student professional development.

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 three additional grant programs (Programmatic-Infrastructure Grants, Joint Venture Grants, and Workshop Grants). At the same time program governance was reorganized around a Presidents' Commission (PC), a Strategic Planning Council (SPC), and a Faculty Consensus Group (FCG). An Executive Committee, or Program Operations

Committee, including the Executive Director, Program Directors and staff, and the SPC Chair, 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 was very detailed and encompassed all areas of potential interest to CSUPERB, including education, research and faculty development, industry/government relations, program development, communications and operations.

CSUPERB has continued to mature and evolve with the cutting-edge industry it serves. The program supported the development of industry-responsive curriculum and, as a result, the CSU has been successful in attracting funding for Professional Science Masters' program development. A Small Business Administration grant to CSUPERB supports the development of professional courses tailored to this regulated industry as part of a Los Angeles region Biotechnology Training Center. CSUPERB served as a catalyst to make California Institute for Regenerative Medicine funding available to train CSU students in emerging stem cell techniques. For each of these projects, CSUPERB partnered with external industry advisors and advocates; these partnerships suggest a successful development and operating model for the program going forward.

Building on these successes, CSUPERB is now directing its attention to the increasing need to recruit, retain and develop qualified scientists and engineers (faculty and students) with backgrounds in the life sciences and other disciplines to support the biotechnology industry and economic development in California. The SPC and the Presidents' Commission recognize the unique value of system-wide, multi-disciplinary faculty participation in CSUPERB activities to meet student learning objectives and campus needs. In addition CSUPERB provides a collaborative, unified voice for the CSU and point-of-contact for external partners. CSUPERB has a long-standing reputation for focusing on both education and research in biotechnology and advocating for industry-responsive workforce development. These factors have set into motion a new strategic planning process and led to the development of the present document to ensure an agile, responsive program supporting excellence in biotechnology education and research across the CSU system.

III. Goals and Strategies

The 2009-2012 CSUPERB strategic plan identifies four priorities for the program: 1) expand biotechnology research opportunities in the CSU; 2) innovate and disseminate biotechnology education; 3) increase visibility of the critical role CSU plays in biotechnology in California and the world; and 4) advise California policy makers and the public on new advances in biotechnology. To implement tactical plans to address these priorities simultaneously over the next three years, CSUPERB will need to garner support, advocacy and resources from the CSU, external industry partners and policy makers.

Strategic Goal #1: Expand biotechnology research opportunities in the CSU

More than 80% of the professionals working in the life sciences industry have an education at or below the master's degree level (2). The CSU educates the bachelor's and master's degree graduates that carry out research and development in the biotechnology industry. To continue to recruit, prepare and retain students to work in this field, CSU faculty and students need the infrastructure necessary to perform collaborative, innovative research. CSUPERB recognizes that research opportunities supported by scholarships or grants allow students access to cutting-edge science and technology. Research support also allows students to focus on scholarship without having to undertake unrelated employment to support their studies. CSUPERB will expand support for faculty-student collaborative research within the CSU and, as a result, will create new opportunities for professional development for both groups.

With the need to address emerging industry sectors, CSUPERB will promote multidisciplinary collaborations between different disciplines within a given university, related research programs within the CSU (ARI and COAST) and groups external to the CSU. The Faculty-Student Collaborative Research Seed Grants program will be expanded in number and award level to provide faculty with the resources required not only to successfully compete for follow-on, externally funded grants, but also involve more students in their scholarship and research programs. Workshops will be organized to develop additional faculty grantsmanship expertise. Emphasis will be placed on supporting hands-on internships for students and sabbaticals for faculty in university- or industry-based research laboratories working in emerging areas of biotechnology. This strategic goal requires ongoing support through internal and external partnerships, industry collaborations, and federal and state grant programs.

Strategic Goal #2: Improve and Develop Innovative Biotechnology Education

The ultimate expansion and retention of the biotechnology industry in California is dependent upon innovative research in our academic institutions and a constant flow of qualified personnel from our educational institutions. Enhancing the pipeline of students to supply a skilled workforce is the emphasis of the CSU system. CSU bachelor's degree programs provide students with the basic technical skills for biotechnology industry production and research. Master's and Professional Science Master's degree programs provide individuals with more advanced skills for project management, research and development positions upon graduation. CSU programs have strong records for preparing and sending students into doctoral and health professional programs, which traditionally provide the high-level talent for basic discovery programs and clinical research management in the biotechnology industry. Historically biotechnology has been served by programs in chemistry and biology, but today's industry depends increasingly on multi-disciplinary teams of researchers that include computer science, physics, business, engineering, public health and mathematics experts as well.

Our strategies to expand biotechnology education are multipronged. First, CSUPERB seeks to increase cross-disciplinary involvement in biotechnology through outreach to

“non-traditional” biotechnology departments and request applications for curricular development in emerging, multi-disciplinary areas. Second, CSUPERB will emphasize funding the development of curricular materials in biotechnology, including online courses, which can be broadly shared across the CSU system increasing access to industry-responsive curricula that meet emerging workforce needs. Thirdly, CSUPERB will provide in-service training for CSU faculty in the newest findings and methods in biotechnology so that faculty members can incorporate appropriate materials into the curriculum.

Strategic Goal #3: Strengthen Understanding of the Critical Role the CSU Plays in California’s Biotechnology Industry

Although CSU universities prepare a significant portion, perhaps even the majority, of the professional workforce for the California biotechnology industry, with appropriate support the CSU could play a more prominent and responsive role in the evolving scientific and business landscape. It is in the interests of the state, the CSU system, and the biotechnology industry to recognize the central role of the CSU in preparing the workforce, and to ensure adequate and growing funding of our efforts in biotechnology education and research. Until now, CSUPERB has underperformed in public relations and in maintaining and highlighting its own superior record of achievement. CSUPERB must clearly articulate the critical role of the CSU in appropriate development of key economic resources for the California life sciences industry.

CSUPERB will partner with biotechnology-focused advocacy organizations throughout the state, including California Healthcare Institute, California Life Science Alliance, and the California Academy of Science, to provide data and feedback on workforce demand, while also fulfilling our advocacy and public recognition goals. We will continue to work with the CSU advocates in Sacramento and Washington, D. C., ensuring that they are knowledgeable about the strength and impact of CSUPERB programs in both applied biotechnology research and education. CSUPERB will reach out to Public Affairs staff throughout the CSU, in the Chancellor’s Office, as well as science editors at regional newspapers, to keep them informed about CSUPERB activities and make sure that CSU biotechnology faculty and student accomplishments and activities are communicated more frequently to the public. To do this, we will address the problem of tracking workforce demand, identifying workforce needs, and documenting student success in biotechnology related fields. These efforts require providing both qualitative and quantitative life science industry workforce demand data to CSU campuses and policy makers. In addition long-term follow-up is needed on all individuals receiving CSUPERB funding. Data collection, reporting and tracking requires centralized processes and database management in the CSUPERB Program Office. Our press releases will include summary data, specific student vignettes, and historical accounts of CSUPERB’s successes through testimonials and personal stories of accomplished alumni.

Strategic Goal #4: Advise and inform California policy makers and the public on new advances and trends in biotechnology education and research

Given CSUPERB's role as the primary liaison for the CSU with the biotechnology industry and the public, it is critical that we develop cogent means to communicate effectively on this topic and find mechanisms for outreach. Data and reports from CSUPERB should inform the public and enable policy makers throughout the CSU and in government to make decisions about complex issues based on life science data and knowledge. In particular we need to communicate that project-based research and classroom learning must be integrated to provide contemporary, effective science education.

CSUPERB will develop the necessary personnel, data and reports to respond to oral and written inquiries about new advances and trends in biotechnology education and research and, importantly, demonstrate how the CSU is in step with the changes in both education and research. Secondly, we will develop a network of scientists, including faculty, staff and students, who will be available to speak with reporters, civic groups, public officials, and K-14 schools in order to explain the science and technology, advise on emerging areas, and point out the ethical implications of biotechnology applications.

IV. Success Indicators

- Increased funding, or percentage of program funding, for collaborative faculty-student research within the CSU
- Increased numbers of students and faculty involved in biotechnology research
- Dissemination of shared, biotechnology curricula CSU system-wide
- Increased numbers of awards and grants made to multi-disciplinary biotechnology research or curriculum development teams
- Continuing emphasis on seminars and workshops to bring multi-disciplinary groups together
- Publish annual program reports, including impact reporting and workforce demand data
- Increased number of press releases and/or press coverage for CSUPERB activities and participants
- Board level involvement of CSUPERB management on biotechnology industry associations

References Cited

- (1) California's Biomedical Industry 2008 Report, California Healthcare Institute and PriceWaterhouseCoopers. Press release available online at: http://www.chi.org/uploadedFiles/News/2008_CA_Biomedical_Industry_Release_Final.pdf
- (2) Peters & Slotterbeck, "Under the Microscope: Biotechnology Jobs in California," (updated June 2005). Electronic version available at: <http://www.labormarketinfo.edd.ca.gov/?PAGEID=136> .