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Professional Science Master's Initiative The California State University

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Systemwide Success Factors: CSU Professional Science Master's

- Context for the CSU Professional Science Master's (PSM) Programs
- Launch and Growth of Systemwide PSM Initiative
- Components of Effective PSM System Strategy
- Outcomes of Systemwide PSM Effort


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Context of CSU's PSM Programs (1): CSU Size and Diversity

- CSU is the largest, most diverse, public higher education system in the United States; it serves **450,000** students
- CSU graduates more than **80,000** students per year
- CSU graduates more African American, Hispanic, and American Indian students than **all other** California universities combined



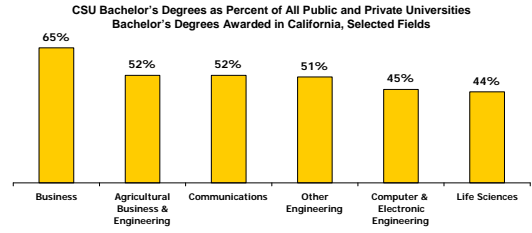
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Context of CSU's PSM Programs (2): Career Entrants for California's Industries

CSU Bachelor's Degrees as Percent of All Public and Private Universities
Bachelor's Degrees Awarded in California, Selected Fields




Field	Percentage
Business	65%
Agricultural Business & Engineering	52%
Communications	52%
Other Engineering	51%
Computer & Electronic Engineering	45%
Life Sciences	44%

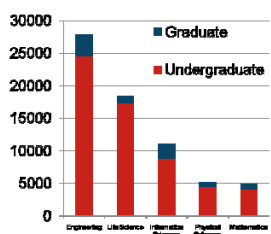
Source: CSU Economic Impact Report

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Context of CSU's PSM Programs (3): Science and Engineering Recruitment Base



Discipline	Undergraduate	Graduate
Engineering	24,371	3,477
Life Sciences	17,241	1,145
Information Sciences	8,688	2,342
Physical Sciences	4,352	802
Mathematics	3,940	941

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Context of CSU's PSM Programs (4): PSM Aligned with Workforce Development

- *Access to Excellence* strategic plan includes a focus on the expanding role of CSU in meeting the State's future workforce needs
 - Each campus has placed a priority on rigorous masters' degree programs that address regional science and technology industry needs

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Launch of Systemwide PSM Initiative

- CSU initiated the largest PSM program in the nation with support from the Alfred P. Sloan Foundation
- CSU commitment was to establish and further develop 14 PSM programs on 12 CSU campuses
- Since the initiative was launched in December 2006, 23 programs have been established on 17 campuses
- Additional programs are being developed through CSU system grants; 30 are anticipated by 2010-11

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Growth of Systemwide PSM Initiative

Current CSU PSM Programs (*new since 2006*)

- 6 biotechnology programs; 2 *bioinformatics*; 2 *stem cell research training*
- 1 *biostatistics*; 1 *medical product development*
- 1 genetic counseling, 1 *medical physics*, 1 *forensics*, 1 *computational science*
- 1 *assistive/rehabilitative technologies*, 1 *computer systems*, 1 *bioengineering*, 1 *communications/photonics*
- 3 *environmental science*

Additional programs to begin in sustainability, engineering

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Components of Effective System Strategy

- Study of Undergraduate Student Interest
CSU system-wide survey of STEM majors:
--2,190 respondents
--7.5% sample of STEM majors on campuses
--55.6% of responses by seniors
--Average GPA in major was 3.18

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Components of System Strategy: Survey

- Major Findings of STEM Student Interest Survey:
--46.3% of students planned to enter graduate school immediately
--45.9% interested in a Master's degree program
--52.5% would seriously consider a PSM program
--78.5% would pursue a PSM degree over a non-science master's degree (MBA or MPA)

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Effective System Strategy: Program Design

- Program Design Aligned with Student Interests:
👉 Reasons for Enrolling in a PSM (ranked):
#1: Academic training with a real-world component
#2: An internship in industry that could lead to a job offer
#3: Study "real-world" problems directly relevant to R&D and product development in industry
#4: Multidisciplinary training to prepare for a wide range of careers

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Effective System Strategy: Partnerships

- Acting on Findings of STEM Student Interest Survey:
👉 Implications for industry partnerships in programs:
#1: Planning of programs to address major hiring needs
#2: Curriculum development to match required skill sets
#3: Industry/employer roles in recruitment, course instruction, project advising, student mentoring
#4: Collaborative design of new interdisciplinary programs that integrate traditional fields of graduate study

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Effective System Strategy: Recruitment

CSU Actions in Response to Student Survey:

- System-wide focus on PSM student recruitment
 - Significant visibility through Online Graduate Application
 - Marketing through CSU web site, student brochure
 - Encouraging pre-PSM opportunities for juniors and seniors
 - Collaborating with community colleges in transfer pathways
 - Seeking PSM scholarships for students with financial need
 - Emphasizing PSM as a professionally oriented alternative to academic Master's degrees in science and mathematics

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Effective System Strategy: Industry Study

- CSU contracted for a study of industry perspectives on the PSM with the California Council on Science and Technology (CCST)
- The CCST study provided
 - results of focus groups with employers
 - analyses by industry sector, and
 - conclusions regarding central roles of employers that became signature of CSU systemwide strategy

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Components of Effective System Strategy

- CCST Finding #1: The PSM program must *establish credibility* to be accepted on a widespread basis
- CSU Action: The CSU has made the PSM an institutional priority at the highest level with exemplary programs part of implementing *Access to Excellence Focus* is on credibility with (a) employers in the private/public sectors, (b) students who will enroll, and (c) faculty who will provide the courses/programs

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Components of Effective System Strategy

- CCST Finding #2: In order to succeed, the PSM must be *targeted* to industries where it is best suited
- CSU Action: The Chancellor's Office has encouraged multi-campus collaboration to meet labor market needs on a coordinated basis where demand is greatest
Approach involves *sharing among campuses of current online courses (e.g., regulatory affairs) collaborative planning of new online courses to meet emerging needs (e.g., stem cell research training)*

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Components of Effective System Strategy

- CCST Finding #3: Industry and universities need to develop better working relationships
- CSU Action: CSU PSM programs are designed to have close working relationships with industry
Partnerships and program advisory boards involve industry in:
 - Advising on program and curriculum development
 - Teaching, supervision, and mentoring
 - Sponsoring of paid internships and projects
 - Supporting employees through tuition reimbursement
 - Collaboration in applied research programs

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Components of Effective System Strategy

- CCST Finding #4: *Statewide partnerships which best leverage the resources of CSU should be explored*
- CSU Action: PSM employer partnerships included establishment of top-level CEO Executive Board
PSM Executive Board involves key industry leaders:
 - Biotechnology (Abbott, BD-Biosciences, Genetech, Gilead)
 - Computer sciences (Cisco, Hewlett-Packard, Qualcomm, Sony)
 - Energy (Edison International, Pacific Gas & Electric)
 - Industry Associations (BIOCOM, Southern California BIO Council)

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Outcomes of System PSM Strategies

Example: Workforce Assistance to Targeted Initiatives

- More than 30% of U.S. biotechnology companies are in California; PSM programs are contributing to their staying
- Significant unmet demand exists for professional scientists in the *biomedical devices and diagnostics* sectors: PSM programs are addressing the demand
- Rigorous science augmented by *regulatory affairs, clinical trials, and quality control* training is essential for industry success; PSM programs are meeting this need

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Outcomes of PSM System Strategies

▪ CSU Multi-Campus PSM Efforts:

- Joint establishment of three-campus biotechnology program in Los Angeles region
- Sharing of existing online regulatory affairs courses
- Creation of new multi-campus online courses in program management, stem cell research training
- Development of new collaborative programs in sustainability

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Outcomes of PSM System Strategy

- 22 programs on 17 campuses in 2009-2010
- 30 new programs on 20 campuses by 2010-11
- Prepare 850 PSM graduates by 2011-12
- Prepare 1,140 PSM graduates by 2012-13
- Established PSM as a prestigious degree
- Created strong and sustained industry partnerships
- Contributed to positive employment climate, especially in biotechnology, life sciences, and medical devices

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Outcomes of PSM System Strategy

Lessons learned from CSU initiative:

- *Lesson #1:* PSM success requires leadership at the highest levels of the system and the campuses
- *Lesson #2:* PSM programs must be designated as institutional priorities and their value widely recognized
- *Lesson #3:* Quality PSMs require extensive effort to develop and collaboration among campuses
- *Lesson #4:* Success depends on direct alignment with workforce needs and regional/state economic priorities

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Outcomes of PSM System Strategy

- **Best practices** identified from CSU initiative:
 - Build on system strengths
 - CSU Program of Education & Research in Biotechnology (CSUPERB)
 - Build on industry priorities—example: internships
 - Employers may need full-year internships
 - They may want team internships, interfacing with their teams
 - Their priority projects for interns may involve global teams
- **Primary conclusion:** the PSM can be a highly successful system initiative with coordinated attention to it as a priority—a nested strategy of support (Chancellor, Presidents, Deans, Faculty)

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