

Broadening Participation Plan

Department of Chemistry, Oregon State University

Maintaining the status of the United States as the world leader in Science is a national priority. To preserve this standing, the nation must address the challenges of increasing global competition by augmenting the pipeline of talented individuals pursuing careers in science and technology. To keep pace in a global economy, pipeline development throughout the Nation must promote the talents and capabilities of the *entire* population. Considering the growing diversity of the population, special attention must be directed in building the pipeline of traditionally underrepresented groups.

As Oregon's land-grant university, Oregon State University (OSU) is uniquely positioned to use its leadership position in Science, Engineering, Agriculture, and Forestry to strengthen participation in Science. As the leading resource for chemistry education and research in the State, the Chemistry Department assumes a major role in human resource development for the Sciences. Although OSU enrollment ranks #3 among institutions in the Oregon University System (OUS), OSU contributions to Chemistry education far outweigh OUS sister institutions. The Department teaches more than 3,000 students per quarter and more than 40,000 student credit hours per year; student credit hours in General Chemistry alone exceeds those in all other OUS institutions combined. The graduate program also maintains the largest Ph.D. enrollment on campus.

The most recent version of the OSU Strategic Plan recognizes three overarching and organizing themes around human-resource development, summarized as "Healthy People, Healthy Planet, Healthy Economy." To support these themes, the University maintains several diversity and recruitment activities through the Office of Multicultural Affairs, the Diversity Program, and the OSU Extension Service. University President Edward Ray has also recently established a Board of Visitors for Minority Affairs to assist in developing strategies for recruitment and retention of underrepresented groups. Because the University-based programs have been institutionalized, the Chemistry Department through its strategic planning process has placed an emphasis on participating in these programs.

The OSU Extension Service has a rich history of pipeline development. Chemistry faculty regularly participate in the program known as Science & Math Investigative Learning Experiences (SMILE). The SMILE Program is a partnership between Oregon State University and 14 Oregon school districts -- mostly rural -- to provide science and math enrichment for underrepresented and other educationally underserved students in grades 4-12. The purpose of the program is to increase the number of educationally disadvantaged students and those from groups with low high school graduation rates who graduate from high school qualified to enroll in college and pursue careers related to science, math, health, engineering, and teaching. The program functions as a "pipeline", taking students from 4th to 12th grade and ultimately into post-secondary education. The SMILE Program conducts a year-round schedule of activities designed to provide hands-on science experience, strengthen students' knowledge, and raise students' academic and career aspirations. OSU faculty and SMILE Program professional staff provide scientific and pedagogical expertise, access to equipment, mentoring, computer networking, teacher

training, and administrative support; the schools provide energetic students and dedicated teachers.

One of the more significant and far-reaching developments for Oregon's population is the growth in Hispanic/Latino Oregonians. In 1990, Hispanics constituted 4% of the State's population; by 2005 that proportion had increased to nearly 10%. Over the same period, the percentages of Hispanic Oregon high-school graduates tripled, and the percentage enrolled as OUS undergraduates doubled. According to U.S. Census data, the educational attainment trends for Hispanic Oregonians are not promising: only 10.1% had a bachelor's degree or higher in 1990 (compared to 20.5% for all Oregonians), and while educational-attainment levels increased in the general population, by 2000 the percentage had actually dropped for Hispanics to 9.6%. The Western Interstate Commission for Higher Education (WICHE) estimates that by 2017-18, 29% of Oregon 12th-graders and 24% of Oregon high school graduates will be Hispanic—about two-and-a-half to three times the current percentage.

Bringing this community into the Science pipeline is one of the more important challenges and opportunities for Oregon and the Nation. It is well documented in Oregon that the majority of first-generation Hispanics seeking post-secondary education enter the system through one of the State's community colleges. To assist in the transition from community college to OSU and limit leakage from the pipeline, the University has established dual-enrollment and degree-partnership programs with 10 Oregon community colleges. The Chemistry Department plays a major role in mentoring students through the transition from the community-college to the University setting. To promote greater success and participation in Chemistry, the Department has also actively recruited these underrepresented students for involvement in summer undergraduate research projects. Planning is also underway to introduce activities in community development that will allow more advanced students at the community colleges to effectively serve as tutors and mentors. Department faculty are also involved in activities such as Science Pub with an emphasis on presenting scientific advances and issues beyond the confines of urban and University communities, extending to those rural sections of Oregon with large underrepresented populations.

The Department has maintained a strategic planning process for more than 30 years. A representative Long Range Planning Committee is constituted periodically (usually every 5 years) to review progress and chart new directions. Oversight for the plan is provided by the Chair and an Executive Committee representing the disciplinary and functional breadth of the unit. The Chair assumes responsibility for initiating and coordinating specific action items, delegating, as appropriate, tasks to individual faculty or Department committees. (The Outreach Committee assumes primary responsibility for broadening participation.) The Chair brings members of the committees into the broader University-based discussions to insure alignment among University, College, and Department priorities. The Department maintains an external Advisory Board composed of alumni and other stakeholders in industry, government, and academe. This group meets on an annual basis to review implementation of the Department strategic plan and to offer guidance on focus and new directions. These annual meetings also provide a useful setting for responding to changes in the operational environment and setting priorities.

The guiding principles of the planning process have focused on

- Excellence in education and scholarship
- Broadening participation by building a community that is premised on collegiality, mutual trust, respect, and integrity
- Valuing diversity in promoting the well-being of students, staff, and faculty through educational and professional opportunities

The Department has used its planning process to effect dramatic changes. During the early portion of this decade, a new undergraduate Chemistry curriculum was implemented around a series of major options in areas encompassing business, forensics, biochemistry, business, and materials. Prior to implementation of these options, the number of Chemistry majors in the Department had stagnated at approximately 40 students. Since the introduction of the new program, we have seen the number of majors rise to more than 170, outpacing University enrollment growth by >20x.

As part of our continuing planning processes, the Department has elected to align research and faculty-recruitment activities in areas that are consistent with University priorities. At present, areas for development and growth are focused on Chemistry of relevance to Biology, Chemistry of the Environment, and Materials Chemistry. We have used this approach to make several targeted faculty hires, which have, for example, redefined the composition of the tenured/tenure-track faculty from 0 to 33% female over the past 15 years. At the same time, we have built and maintained a graduate-student body that compositionally matches national averages for underrepresented groups. As noted above, we face specific challenges with respect to recruiting Hispanic students, which we plan to address over the coming decade.

Going forward, the Department is focused on building a comprehensive participation program that limits leakage in the pipeline by formulating strategies that fully engage students through their K-12, undergraduate, and graduate careers. In our planning and execution, we are

- refining diversity goals
- improving the collection and evaluation of empirical data on underrepresented minorities
- promoting the value of enhancing diversity and providing the impetus, foundation, and tools to take action on this issue
- identifying, rewarding, and disseminating best practices for enhancing diversity
- providing resources and incentives to improve mentoring for underrepresented minorities during transition periods when there may be gaps in mentoring
- advocating for policies and funding at the University level to support diversity initiatives
- facilitating mentoring of junior scientists by senior colleagues
- building a pool of mentors and mentees who can promote the value of mentoring
- inviting underrepresented students to participate in summer research projects and workshops
- directly informing communities throughout Oregon about opportunities and advances in chemistry education and research