SYSTEMIC CHANGES IN THE CHEMISTRY CURRICULUM—PLANNING GRANTS

Curriculum for Chemistry in a Large Urban University

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Chemistry Initiative

A curriculum for chemistry at the undergraduate level is being developed to better prepare chemistry and biochemistry majors for employment through a novel Joint Industrial Chemistry Degree (JICD) which includes a two-year work experience graded by term papers and oral presentations. Majors are also afforded extensive research experience through a new undergraduate degree graded by thesis with an oral defense. These changes allow the intensive industrial and research degrees to be conducted off campus, and facilitate the path to a degree by economically disadvantaged students, by developing a module-based study sequence at the junior and senior level. The curriculum also introduces new technologies through extensive use of computers, and it improves opportunities for minority groups by using concepts adapted from existing Native American, Women in Science, and High School Outreach programs. Concurrent pathways at the freshman and sophomore level for non-science majors, life science majors including nursing and pre-meds, and physical sciences majors including pre-engineering are being developed. Close collaboration with the chemical and biochemical industry, other departments within the University, and community colleges and other four year colleges in the Pacific Northwest is a part of the project. Program assessment is based on methods developed in collaboration with a management consultant group. Results will be disseminated by peer-reviewed publications, monographs presenting upper-level modules, software publication and presentations at national meetings.

Planning Grant for Development of Systemic Undergraduate Chemistry Curriculum

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Chemistry Initiative

This project places students at the center of their learning experience, and encourages both faculty and students to: (1) discuss and understand the importance of applied chemistry in our society; (2) participate in activities that encourage exploration and cooperative learning; (3) engage in a greater diversity of instructional strategies; and (4) exploit the role of new technologies as a means of implementing these approaches to learning. The curricular materials developed are based on a three-part balance between the factual aspects of chemistry (content), the role of chemistry in our daily lives, and the process by which information is located and discovered and by which problems are solved. The project develops a wide variety of resources which draws students into all three of the above aspects of chemistry, and from which faculty may select material that best serves their own students and their interests and talents. The project focuses on content and

concept sequencing, appropriate use of technology, educational strategies, and a structure for dissemination, faculty workshops, presentations and publications.

ChemPRIME: A Curriculum of Chemical Principles Through Integrated Multiple Exemplars

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Chemistry Initiative

A consortium of nine institutions of higher education headed by Lehigh University is making fundamental revisions of the chemistry curriculum at all levels for majors in chemistry, for future professionals, scientists and engineers, for responsible citizens, and for continuing education students. The ChemPRIME curriculum utilizes current, high-visibility, multiple exemplars to structure the chemistry. Options in exemplars, depth and rigor of treatment, learning style format, review, self-testing, and evaluation create a flexibility made possible by CD-ROM technology. Students create self-customized courses. Ultimately a single publication integrates all courses in the curriculum. The planning process involves faculty in: (1) selection of exemplars for introductory and analytical chemistry courses; (2) definition of basic chemistry content covered in these exemplars; and (3) combination of exemplars into tracks through the courses in the traditional curriculum. The interdisciplinary nature of many exemplars promotes the integration of chemistry and related disciplines, while traditional core concepts allow reliance on the experience and training of faculty. The ChemPRIME curriculum creates courses of unprecedented flexibility because: (1) different exemplars treating the same basic chemistry are interchangeable; (2) depth and rigor may be selected by an instructor; (3) courses may be incrementally updated; (4) students select the presentation optimized for their learning style; (5) laboratory experiences are closely linked to exemplars; and (6) customized courses for new constituencies may be more easily designed and tested, broadening the impact of chemistry through the traditional college curriculum. Evaluation of individual components and the overall ChemPRIME project will be readily conducted. Student access to the developing program through a network will allow determination of component use and learning success via embedded self-testing and traditional methods.