

*GEMS—Gateways to Excellence in Math and Science:
A Quality Enhancement Plan for The University of Texas at Dallas (UTD)*

Gateways to Excellence in Math and Science (GEMS) is UTD's comprehensive plan to enhance the quality of student learning in science, technology, engineering, and mathematics (STEM) by providing students with innovative, intensive, and active learning experiences both inside and outside the classroom. The project targets success, retention, and persistence in gateway math and science courses that play a critical role in influencing student decisions not only to continue their studies in degree programs heavily grounded in mathematics and the sciences but also to continue their college careers. During the first five years of implementation, GEMS will involve a series of interventions, including curriculum alignment and realignment, course redesign, new course design, the introduction of new modes of curriculum delivery, and faculty development. The overall objectives of GEMS are to provide a foundation and locus for sustainable faculty and administrative activities that will (a) increase the retention of students in STEM fields; (b) decrease the number of *D* and *F* grades and withdrawals in STEM classes; and (c) create supportive, engaging learning opportunities.

New mainstream courses for students in calculus and chemistry will be developed to stimulate and help to prepare students for future research opportunities. Using an internally developed alignment and curriculum mapping method, gateway calculus and general chemistry sequences will be integrated with other STEM dependent courses inside and outside the School of Natural Sciences and Mathematics to ensure that students are equipped with the skills and knowledge required for the advanced studies they will undertake. A highly visible GEMS Success Center will be established and serve as a centralized facility where a community of learners will be able to receive assistance with current courses from faculty members and peers and also work on self-paced advanced topics. Staffing of the center will include faculty, teaching assistants, and supplemental instruction instructors, as well as other student peer group leaders (GEMS-PLTL Leaders) who will facilitate deep learning of material through instructional approaches modeled after programs recognized for their success. A Mathematics and Science Education Council will foster communication among academic schools and programs engaged in STEM curricula at UTD and promote innovative ideas for mathematics and science instruction. Using an integrated quantitative and qualitative assessment plan based on student learning outcomes, the Council, in conjunction with the GEMS assessment team, will monitor and analyze assessment data concerning student performance and engagement to evaluate and to understand student performance more fully. The analysis of these data will provide the university with previously unavailable information about the undergraduate student experience to benefit the entire campus community as GEMS helps to ensure improved learning in gateway courses.

GEMS was developed after broad, intense discussions about possible QEP plans to enhance student learning at UT Dallas. In 2006, a sixteen-member QEP Council with broad campus representation was convened to review the potential impact upon student learning of the hundreds of suggestions gathered for the QEP from students, faculty, alumni, and friends of the university. The decision to develop specific interventions that target gateway courses emerged from the Council's consideration of ongoing studies conducted for several years by the dean of undergraduate education; these data indicate problems in students' performance in introductory math and science courses and some discouraging patterns concerning students' persistence in, or migration from, STEM courses and academic programs.

GEMS addresses STEM education issues that have been experienced and well-documented at the national and international levels, but GEMS is specifically designed to operate within the context of a university whose founders in 1969 argued that "to grow industrially, the region [Texas] must grow academically; it must provide the intellectual atmosphere which will allow it to compete in the new industries dependent on highly trained and creative minds." With this charge in mind, UTD's mission statement charges the university to serve "the Metroplex and the State of Texas as a global leader in innovative, high quality science, engineering, and business education and research." GEMS is organically related to both the vision of the founders of the university and the mission-critical role that UT Dallas must play in the development of a robust cadre of well educated young men and women who will dedicate their careers and their professional passion to the sciences.

For additional information, contact: Thom D. Chesney, Ph.D., Associate Provost for Student Success and Assessment, tchesney@utdallas.edu.