CSU CHANNEL ISLANDS
STRATEGIC INITIATIVES | NON-FUNDED WORK

Course Redesign

Strategic Initiatives and Actions

Student Success

2.3 Implement a campus-wide approach to meet requirements of Executive Order 1110 to ensure that the curriculum, student support and placement procedures facilitate student success in mathematics and quantitative reasoning.

Inclusive Excellence

3.8 Analyze disaggregated student success data across the University to identify barriers to completion and develop a campus-wide strategy to eliminate student equity gaps.

Project Summary

Redesigning high DWF rate courses in Mathematics and Chemistry to help increase student success and to help close the achievement gap.

Lower division courses with high DWF rates in Mathematics, pre-calculus (MATH 105) and calculus I (MATH 150), and Chemistry, general chemistry I (CHEM 121), are being redesigned by faculty to increase student learning and success. Faculty leads in each of these programs are coordinating with other faculty teaching these courses to implement these changing in the 2019-2020 academic year. Both course redesign efforts intend to reduce achievement gaps by developing faculty in creating more culturally inclusive learning environments. They follow the principles of being grounded on evidence gathered in the institution and best-practices found in the literature, on being sustainable beyond the duration of the redesign, on meeting the students where they are in terms of academic preparation, on focusing on student centered objectives, and on assessing the effectiveness of the redesign.

Both course redesign efforts focus on identifying barriers to student success, and to developing effective practices to eliminate student equity gaps. The math proposal also provides support for students to facilitate student success in their quantitative reasoning courses, for students in the calculus track.

For math, the project aims at adjusting the faculty culture and operations in the way it thinks about and organizes the delivery of two core courses, MATH 105 (Pre-calculus) and MATH 150 (Calculus I). The faculty lead of this project will organize Instructor Orientation Workshops. During the week before fall 2019 classes begin, and again during the week before spring 2020 classes begin, instructors of MATH 105 and MATH 150 will be brought together in a workshop that will orient them to the way the redesigned courses will work. This orientation will include how course coordination will work, how embedded course tutors will work, the aim of a common final and other shared assessments, overall project assessment, syllabus expectations, realizing student learning outcomes, and ways to incorporate the technology in the course. The workshop will also establish the expectation that instructors work as a team, sharing ideas and questions with one another and with the course coordinator. The math proposal will also implement embedded course tutors. The project will work with the Student Academic Success Services program to pilot the use of embedded course tutors in half of the section of MATH 105 and MATH 150. Faculty will be oriented to the best practices in working with embedded course tutors to support student learning. MATH 105 and MATH 150 will have a tenured or tenure-track faculty member in mathematics assigned to coordinate the implementation and assessment of all sections of the redesigned course.

For chemistry, the project will begin with a learning community (LC) aimed at analysis of departmental, CSU, and national data pertaining to student success in general chemistry. As well, the LC will create a comprehensive literature review of state-of-the-art general chemistry interventions, ensuring that the approach will be rigorously evidence-based. The LC will place special emphasis on best practices for diverse communities and addressing problems arising from long-standing inequities and uneven student preparation. The LC will then generate a plan for general chemistry

revision and revision assessment. Most importantly, the LC will establish clear and literature-based goals for improvement of student DFW rates and achievement gaps, *which remain unarticulated on this campus and systemwide.*

The LC will create a set of interventions aimed at improving engagement and outcomes of in general chemistry, with special emphasis on supporting underserved student populations. Possible outcomes range from: correcting instructional practices that can perpetuate bias; to flipped classrooms; to active learning modules; to classroom-based supplemental instruction; to re-evaluation of the overall set of subject elements. The LC's interventions and assessment tools will be implemented in general chemistry sections. The interventions and outcomes will then be reported locally, but also at national chemistry pedagogy conferences such as the Biennial Conference of Chemical Education, and in the peer-reviewed literature.

Baseline Data

The math courses to be redesigned are pre-calculus (MATH 105) and calculus I (MATH 150). Since 2015, DFW rates in Pre-Calculus have fluctuated between 26% and 39%. The DFW rates in Calculus have fluctuated between 19% and 42%. On average, our DFW rates in both courses is 32-33%. Chemistry will be focusing on general chemistry I (CHEM 121). On the DFW rate for CHEM 121 is around 30%. Since 2015, the DFW rate has ranged between 21% and 39%.

Goals

Math has set a goal moving the DFW rates in pre-calculus and calculus to the national average for these courses. Currently, at CI, the DFW rates are higher than this average. The national average for MATH 105 is 27%, and for MATH 150 it is 22%. Chemistry needs to determine what its goals will be once the learning community is formed. There is a general goal of lowering the DFW rate, lowering the equity gap, and improving student learning. Both proposals also aspire to provide appropriate faculty development and coordination into these classes that will help the instructors work together to increase student success, and that will allow the implementations to be sustainable beyond this initiative.

Project Status

Planning phase

Key Leaders and Divisions

Lead Division	Division of Academic Affairs
Collaborating Division	
Action Champions	Dean of A&S, Vandana Kohli
Action Project Leads	Jason Miller, Blake Gillespie
Action Collaborators	Jill Leafstedt; instructors for MATH 105, MATH 150, and CHEM 121