



Calculus and Pre- Calculus Academic Support Initiatives

October 30, 2019

HIGHLIGHTS

- All 12 institutions have implemented or are currently in the process of implementing various initiatives to increase student success in calculus and pre-calculus courses.
- Common changes include the development of alternative major-specific pathways or courses and the streamlining of pre-calculus courses.
- Unique initiatives include the use of early alert systems, faculty communities, and summer boot camps.
- Preliminary data show that such efforts are improving student success.

Introduction

Each institution in the State University System (SUS) has implemented or is currently in the process of implementing initiatives to increase student success in calculus and pre-calculus courses. Program implementation and cost vary by institution and initiative. Common initiatives implemented to date include the utilization of online testing platforms for more accurate math placement, curriculum redesign based on New Math Pathways practices, course redesign and coordination, tutoring, and incorporation of learning assistants in lectures and practice sessions. Some unique initiatives identified include the use of early alert systems and data dashboards specific to math, the formation of faculty communities, and summer boot camps. Preliminary data from various initiatives shows that such efforts are improving student success.

Examples of Common Initiatives across the System

Math Placement

To ensure students are placed in level-appropriate math courses, online tests are utilized. Students who test into developmental math courses may complete online modules to fill in knowledge gaps. Upon completion of the modules, students are given the opportunity to re-test and place into a higher math course.

Curriculum Redesign / New Math Pathways

Math curricula have been redesigned to create discipline-specific pathways and also to streamline paths to calculus. Alternative pathways have been established for disciplines such as the social sciences or arts where calculus is not required. For disciplines where calculus is necessary, specially designed calculus courses have been created to focus on the knowledge needed for those majors. In addition, institutions offering required pre-calculus courses based on student placement scores have merged those courses into a single course to move students more quickly into calculus.

Calculus and Pre-Calculus Academic Support Initiatives

Course Redesign and Coordination

Examples of course redesign initiatives include the following types of activities.

- Course coordination to ensure the use of common syllabi, assignments, and teaching methods
- Technology in the classroom to gather formative data
- Utilization of open-source course materials such as textbooks and online platforms for completion of homework assignments
- Mandatory practice sessions, labs, and math-specific life skills courses

Examples of Unique Initiatives

Math Early Alert Systems and Data Dashboards

Various forms of an early alert system for students enrolled in math courses have been implemented, which facilitate early interventions for students identified as being at risk of failure based on attendance and grades. Students are connected to the appropriate academic and social support resources by a coordinator or professional advisor. Data dashboards also provide additional information to coordinators, academic advisors, or faculty who can then be proactive in meeting the needs of students.

Faculty Communities

Faculty communities are designed to increase collaboration and coordination across the math department, provide a platform to share teaching ideas and methods, engage in professional development, and share common challenges and successes.

Summer Boot Camps

Two types of summer boot camp programs have been implemented, both a week in length. One program is geared towards engineering students who did not initially qualify to be placed in calculus, while the other program is geared towards students who tested into developmental math courses. Both are designed to help students fill knowledge gaps and provide students with an opportunity to retest and place into a higher-level math course.

Impact on Student Success

Analysis of preliminary data reported indicates a positive impact on student success across all institutions. Indicators of student success include but are not limited to:

- decreases in the number of students who earn a grade of D or F, or withdraw from calculus I and calculus II courses,
- overall decreases in drop rates,
- increases in passage rates in calculus and pre-calculus courses, and
- decreases in overall enrollment in developmental math.