

# **Institution-Set Standard Report: Increasing Transfer-Level Math Achievement in the First Year**

**BAKERSFIELD  
COLLEGE**

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Accreditation and Institutional Quality (AIQ) Committee  
& Office of Institutional Effectiveness (OIE)  
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## **Executive Summary**

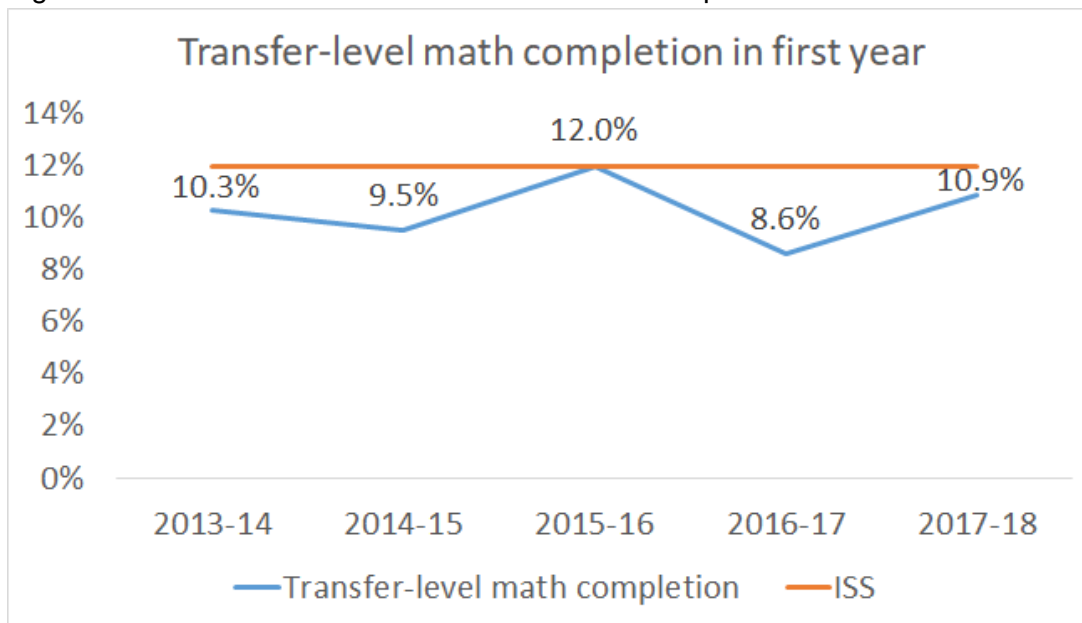
At the October 19<sup>th</sup> College Council meeting, President Christian directed the Accreditation and Institutional Quality (AIQ) committee to work with the Office of Institutional Effectiveness (OIE) to produce a plan to increase the college's performance on the Transfer Level Math Achievement Year 1 Institution-Set Standard for presentation at the November 16<sup>th</sup> College Council meeting. In the development of this report, AIQ and OIE solicited feedback from math faculty, psychology faculty, and administrators. This report makes the following recommendations, which align with the college's Guided Pathways framework:

- 1) Reduce Math Delay (Enter the Path)
- 2) Track Math Curricular Development (Clarify the Path)
- 3) Increase Academic Support Services to Math Classes without Embedded or Concurrent support (MATH B4, MATH B23, PSYC B5) (Ensure Learning)
- 4) Enrollment Management to Support Student Achievement (Enter & Stay on the Path)
- 5) Increase Application of Multiple Measures Placement (Enter the Path)

## Background

In October 2018, it was determined that BC had fallen substantially below its Institution-Set Standard (ISS) for the percentage of incoming students who completed transfer-level math in the first year, as shown in Figure 1.

Figure 1. Five Year Trend in Transfer-level Math Completion in the First Year



The process for addressing this situation involves the Office of Institutional Effectiveness developing a report that examines the probable causes and remedies for this situation. In this report, we look at factors that may have caused the institutional bottleneck in transfer-level math throughput. We also examine which math pathways are historically associated with the greatest throughput and the distribution of enrollments into those courses. Finally, we suggest some possible courses of action to improve the transfer-level math ISS metric.

### Student Educational Goals

An examination of the educational goals of BC's student body over the past five years found a consistent and stable distribution of educational goals such that, among those with declared educational goals, approximately 70% were interested in attaining a bachelor's degree (indicating that they require a transfer-level math course), and about 10% were interested in pursuing a terminal Associate's degree. The remaining students indicated a variety of other educational goals, including short-term certificates, skills builders, and "reverse-transfer" university students picking up courses which do not necessarily require math coursework.

An April, 2018 analysis of BC's programs of study by OIE<sup>1</sup> found that about 70% of BC's

<sup>1</sup> This report is available to the public through the Office of Institutional Effectiveness website: <https://www.bakersfieldcollege.edu/sites/bakersfieldcollege.edu/files/Math-requirements-by-program-of-study-2018.04.30.pdf>.

programs could have their math requirement fulfilled by a transfer-level math course such as statistics (MATH B22 or PSYC B5) or math for elementary teachers (MATH B4A). The remaining programs mostly required a calculus pathway. Even among terminal associate degree programs, transfer-level math remains a viable option for fulfilling math degree requirements--and it leaves the door open for possible future decisions to transfer and attain a bachelor's degree. It is important to note that mathematics for career education (TECM 52) was not offered at the time of this report and was not included in the analysis.

Given the distribution of student ed goals at BC, the reason for low transfer-level math completion in the first year does not appear to be due to lack of student interest in the math pathway.

### Delay in Math Entry

Delay in math entry describes the postponement of a student's first math course until after the student's first semester at Bakersfield College. The 2018 October Peter Bahr study "Deconstructing Developmental Pathways and Outcomes at Bakersfield College"<sup>2</sup> reports that that a significant proportion of BC students do not enroll in a math course in their first semester.. While the report focused upon students entering their pathways through a developmental offering, the report provides a basis for extrapolation.

Table 1: Selected course-taking behaviors by first math course attempted (Bahr, 2018, p. 39)

	N	% delayed first math	average number of terms from college entry to first math	% successful in first math (first attempt)
ACDV B72	1,070	46%	0.8	61%
Math B60	1,435	46%	0.6	54%
Math B65	146	52%	0.8	59%
LRNC B530 (Math B60)	68	68%	1.1	85%
Math B70	938	44%	0.6	53%

The prevalence of reported delay in developmental math course-taking by Bakersfield College students suggests that delay is an impediment to achieving math completion in the first year.

<sup>2</sup> This report is available to the public through the Office of Institutional Effectiveness at [https://www.bakersfieldcollege.edu/sites/bakersfieldcollege.edu/files/Bahr\\_DevPathways\\_102618.pdf](https://www.bakersfieldcollege.edu/sites/bakersfieldcollege.edu/files/Bahr_DevPathways_102618.pdf)

## Low Persistence to Throughput

The October 2018 Peter Bahr study shows which math pathways are associated with the greatest throughput, after controlling for various factors including gender, age (binary: under 20 vs. 20+), URM status, term of entry, FT/PT status in first term and whether they were placed via the test or multiple measures.

Figure 2. Predicted Probabilities of Completing Transfer-level math within one year disaggregated by HS GPA and initial math course (Bahr, 2018)

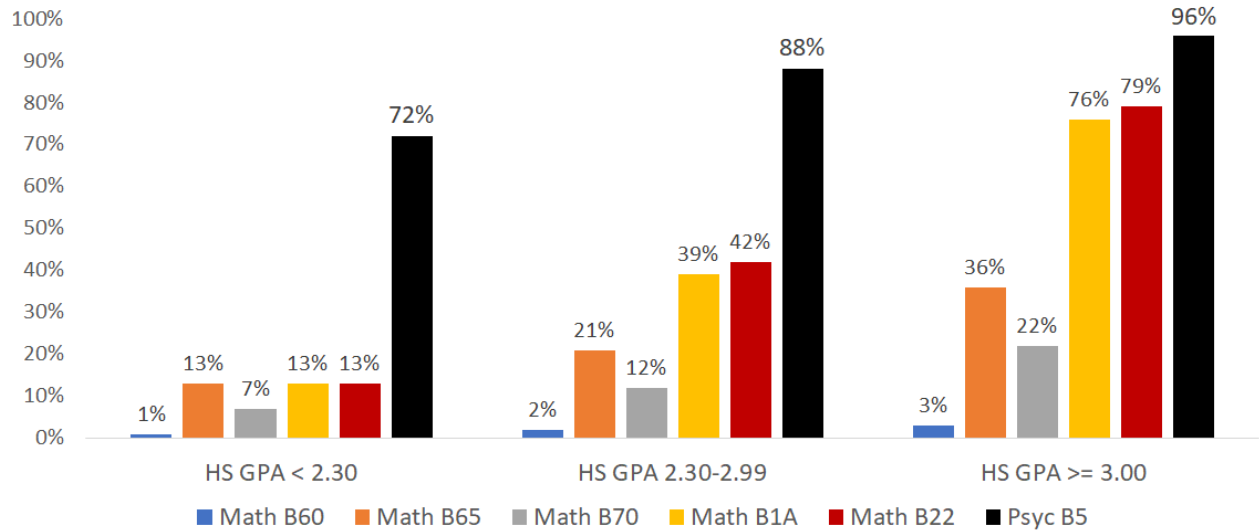


Figure 3. Percentage of students starting in a given math class compared to the predicted throughput for students in the mid-tier GPA band (2.30 – 2.99)

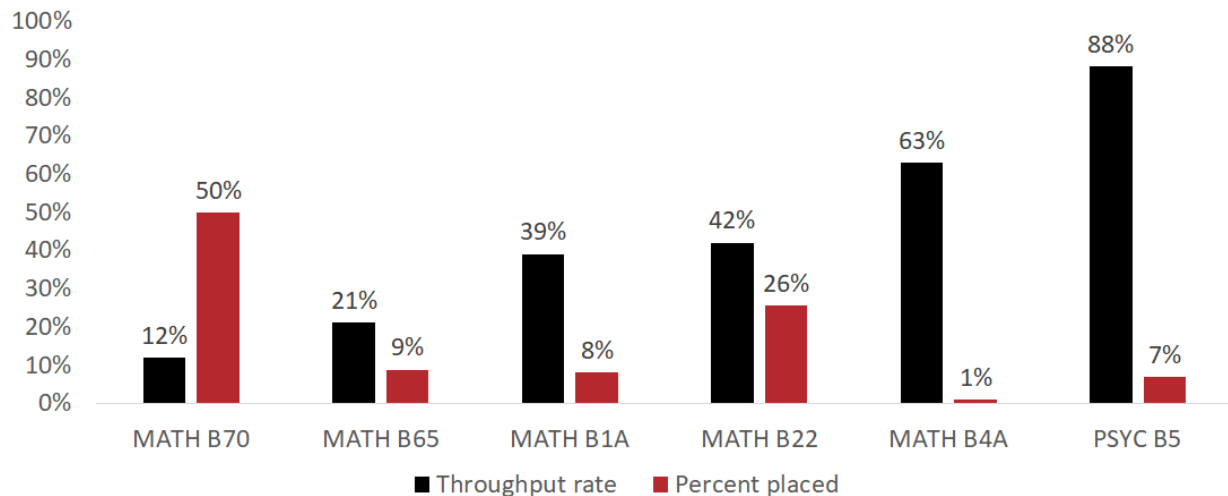
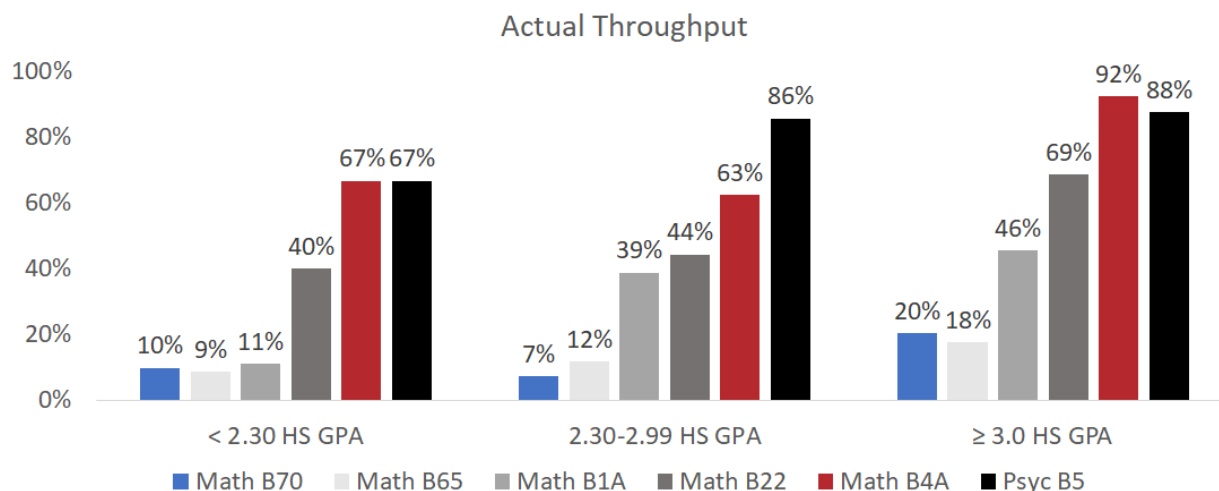


Figure 4. Observed throughput rates for students starting in selected math classes by High School GPA



Two courses stand out in this report as having high throughput, even among students with lower high school GPAs: PSYC B5 and MATH B4A.

### Curricular Redesign

In response to AB 705 requirements, the math department has substantially redesigned its course offerings to incorporate embedded support within two transfer-level math courses, MATH B1A (Precalculus I) and MATH B22 (Elementary Probability and Statistics) (See Appendix). The developmental math sequence has also revised to include two new courses at one level below transfer: MATH B75 for the BSTEM path and MATH B72 for the non-BSTEM pathway.

Based on a September 2018 forecast from the Office of Institutional Effectiveness,<sup>3</sup> we can expect that in fall 2019 about 15% of incoming students will be eligible to place directly in Precalculus I or II based on their strong academic performance in high school, with another 3% being eligible for Precalculus I with concurrent support, per the Chancellor's Office default rules. Another 15% of students will be eligible for direct placement into Statistics, Finite Math, or Math for Elementary Teachers (aka, SLAM), as appropriate for their pathway. The remaining 67% of incoming students will be eligible for placement into transfer-level SLAM coursework with concurrent support.

What is unknown is the percentage of the incoming cohort that will not have completed Algebra II/Intermediate Algebra in high school and yet will still wish to pursue a BSTEM program of study that requires a calculus-based math pathway. A statewide analysis from MMAP found that few students who did not complete Algebra II in high school pursue transfer-level BSTEM

<sup>3</sup> The full OIE report is available here:

[https://www.bakersfieldcollege.edu/sites/bakersfieldcollege.edu/files/MathPlacementForecastFall2019\\_v2.1.pdf](https://www.bakersfieldcollege.edu/sites/bakersfieldcollege.edu/files/MathPlacementForecastFall2019_v2.1.pdf).

coursework. In other words, students who pursue STEM programs of study tend to be students with stronger backgrounds in math. On the other hand, Business is a popular area for students and many incoming students wish to pursue a program of study in this area. Thus, to the extent that there are students who have not completed Algebra II who wish to pursue BSTEM programs of study, they will need access to Intermediate Algebra (MATH B70 or equivalent) as the first step in their math journey.

## **Recommendations**

### 1. Reduce Math Delay (Enter the Path)

Take action to reduce math delay. Counseling & advising will be key to ensuring students take the correct math course in a timely manner, ideally in the first semester. Counselors and advisors need to be prepared for the upcoming curricular changes so they understand how to appropriately advise and schedule students' math coursework in light of their program of study, educational goals, and placement. In addition to involvement by counselors and educational advisors, Learning and Career Pathway completion coaching teams should address the timely enrollment of students into an appropriate math pathway.

### 2. Track Math Curricular Development (Clarify the Path)

The math department is developing concurrent and embedded support courses for MATH B22 and MATH B1A, as well as innovative two-semester course sequences that are intended to maximize throughput. This curriculum innovation should be supported and evaluated for efficacy in a timely manner to provide formative feedback to these efforts.

### 3. Increase Academic Support Services to those Math Classes without planned embedded or concurrent support (Keep Students on the Path and Ensure Learning)

Provide targeted academic support services to math classes without embedded or concurrent support (MATH B4A, MATH 23, and PSYC B5) via Tutoring and Supplemental Instruction. The SPSS statistical program has been installed in one of the computers in the tutoring center. Additional computers (a total of 6) will have SPSS installed. This is a cost-effective solution because BC has an institutional license for SPSS and no additional fees will be generated by adding the software to these computers. This will increase access to support services for PSYC B5 students because other labs on campus don't have SPSS installed.

### 4. Enrollment Management to Support Student Achievement (Enter and Stay on the Path)

Provide transfer-level math courses to match student need. An increase in the number of transfer level math courses can be expected due to the math department's curriculum redesign. Scheduling will be critical to ensuring that students are able to enroll and progress in a timely manner.

Some specific courses warrant further comment. Mathematics for Elementary School Teaching (MATH B4) has been identified by both the Guided Pathways Implementation Team (Goal #4) and the Budget Committee as a bottleneck course for students intending to transfer to become teachers. The math department has increased the number of Math B4 sections from 1 in Fall, 2018, to 4 in Spring, 2019, and is encouraged to explore further increasing the number of sections offered in future semesters. The math department and counseling are also encouraged to discuss the applicability of Finite Mathematics (MATH B23) to programs for students seeking transfer. Finite Math (MATH B23) is a three-unit transfer-level math course which has traditionally been taken by business students and may have wider applicability to students beyond this traditional role.

Another option involves the exploration of block scheduling or scheduling systems like Reg365 which permit students to register for a whole year of courses. Math students enrolling into one semester below transfer courses (MATH B75 and MATH B72) need to be supported in their timely enrollment into the second semester of their math sequence to maximize the probability that they complete transfer level math in one year (two semesters).

Another enrollment management concern involves students who fail their first semester of math. Students cannot enroll to retake the course they failed until after the grade is input by the instructor, which is likely to occur after most, if not all, math sections for the upcoming semester have filled. Enrollment management should investigate options which enable failing students to avoid being forced to wait another semester before retaking the math course.

##### 5. Increase Application of Multiple Measures Placement (Enter the Path)

Despite BC's early experimentation with multiple measures, the college was only able to successfully apply high school performance information to about 30% of students in the placement process. With recent developments in the use of CalPASS Plus and CCCApply high school performance data, the college should be able to at least double and perhaps triple that rate, which will increase the number of students with direct access to transfer-level courses by further reducing underplacement.

Appendix A. Mathematics Course Restructure and Placement for Fall 2019  
(Proposed redesign as of 11/13/18)

**BSTEM PATHWAY**

**MathB1A Pre-Calc I**  
4 units

HSGPA  $\geq$  3.0 or

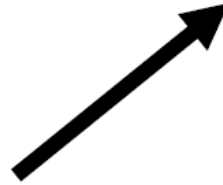
HSGPA  $\geq$  2.6 AND enrolled in HS Calc.

**MathB1AL Pre-Calc I with support**  
4.5 units = 5.5 hours

HSGPA  $\geq$  2.6 or  
Any GPA and enrolled in HS Pre-  
Calc.

**MathB23 Finite Math**  
3 units

No changes



**MathB75 - Foundations of Algebra**  
Lowest HSGPA, No Intermediate  
Algebra or long time out of school;  
STEM students  
5 units = 9 hours



**NON-BSTEM PATHWAY**

**MathB22 Statistics**

**4 units**

HSGPA  $\geq 3.0$

**MathB22L Statistics with support**

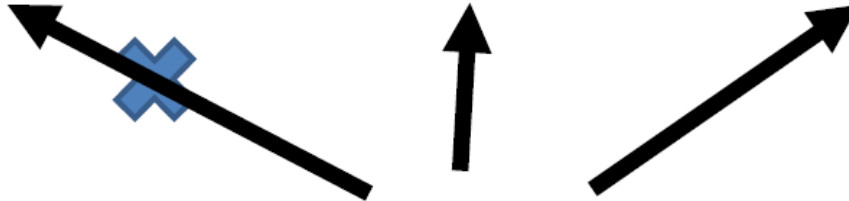
**4.5 units = 5.5 hours**

$2.3 \leq \text{HSGPA} \leq 2.9$

**MathB4A**

**4 units**

no changes



**MathB72 - Practical Mathematics**

Lowest HSGPA; No Intermediate Algebra or equivalent; long time out of school; NON-STEM students  
4.5 units = 6 hours

Proposed redesign as of 11/13/18