GAVILAN COLLEGE
HISPANIC SERVING INSTITUTION

# Program Review All Fields

## Mathematics and Math Lab [1]

## Main

Overview
**Academic Year** 2022 - 2023

**Originator** Nari, Jennifer

**Division** Curriculum Division 10 - Liberal Arts and Sciences

**Department** Natural Sciences & Math

**Program** Mathematics and Math Lab

**Program Type** Instructional

## Co-Contributors

Contributor

- Dachkova, Elena
- Dharia, Sejal
- Dresch, Marla
- Medina, Erik
- Potter, Raylene
- Wagman, Ken

## Program Mission and Accomplishments

# Gavilan College Mission Statement

**Gavilan College actively engages, empowers and enriches students of all backgrounds and abilities to build their full academic, social, and economic potential.**

**Provide a brief overview of how the program contributes to accomplishing the mission of Gavilan College. In addition to a basic overview of your program's structure and services, be specific in connecting your program's services to elements of the mission statement (300 words or less).**
The Mathematics program is one of the five degree programs in the Natural Sciences Department. The program offers A.A. and A.S. - T degrees in Mathematics. The program offers transfer level courses for STEM and non-STEM majors.

Mission Statement: Gavilan College actively engages, empowers and enriches students of all backgrounds and abilities to build their full academic, social, and economic potential.

- Any Gavilan student with the goal of degree or transfer must complete math
- Support classes for STEM and SLAM courses

- Academic support for math – Math Lab. STEM Center, Embedded Tutoring
- STEM support – academies, STEM counselors, faculty mentoring
- Career exploration – internships

**On the PIPR website, locate and review your previous program plan and subsequent annual updates. After studying, please list:**

Response and follow-up to previous program reviews

1. **Increase enrollment in support courses and boot camps**

    - **Enrollment in support courses and boot camps have been steady despite lower enrollments in math courses overall Check the numbers**

    **Increase the percentage of course offerings taught by full-time faculty to 50%.**

    - **With fewer course offerings, a greater proportion of classes are taught by FT faculty.**

    **Increase retention and first-time success rates of students enrolled in transfer-level math courses**

    - **Not yet achieved this goal**
    - **Numbers are steady considering impact of pandemic**

    **Increase course offerings that use open-source materials**

    - **We don't have good data on the number of courses which are ZTC**
    - **Could help attract students to support classes**

2.
3.

**Have the services or courses of your program changed over the past three years? Please explain (300 words or less).**

- Increased online and hybrid offerings
- Elimination of pre-transfer level math courses
- During pandemic, merged STEM Center and Math Lab and offered tutoring via Zoom
- Started offering Math 11 in Spring 2020
- Explored different modalities for course offerings

## Student and Program Outcomes

College Goal for Student Achievement
**The following questions refer to data regarding student achievement.**

**Find your discipline's course success information. Consider your department success rate trends over the last three years. Compare your overall success to the college average.**

**Are these rates what you expected after comparing with the college average? Are there any large gaps? Is there anything surprising about the data? What trends are suggested by the data?**

| College | Success | Retention |
|---|---|---|
| 2019-2020 | 70.4 | 84.9 |
| 2020-2021 | 70.3 | 85.2 |

| | | |
|---|---|---|
| 2021-2022 | 69.4 | 86.8 |
| Math | | |
| 2019-2020 | 61.8 | 78.4 |
| 2020-2021 | 63.1 | 81.2 |
| 2021-2022 | 63.1 | 81.3 |

Math success and retention rates are lower than the college average. There are several strategies that can be employed to address this issue.

One important approach is to provide students with targeted support and resources that are specifically designed to help them succeed in math. This can include tutoring (embedded and drop in), study groups, online resources, and mentoring. By offering students multiple avenues for assistance and support, we can help to ensure that students have the tools they need to succeed.

Another important strategy is to create a supportive and inclusive learning environment that encourages students to feel comfortable asking questions and seeking help when needed. This can involve incorporating interactive and engaging activities into the classroom, encouraging peer-to-peer learning, and providing opportunities for students to practice their math skills in a low-stakes environment.

It's also important to recognize that success in math is often closely tied to students' prior experiences and attitudes towards the subject. By addressing these underlying factors, we can help to build students' confidence and motivation, which can in turn improve their success and retention rates.

Ultimately, addressing low success and retention rates in our math classes requires a multifaceted approach that prioritizes student support, engagement, and empowerment. By working together, we can create a learning environment that fosters success and helps students achieve their academic and career goals.

**Now find your division persistence information. Consider your retention rate trends over the last three years. Compare your overall retention to the college average.**

**Are these rates what you expected after comparing with the college average? Are there any large gaps? Is there anything surprising about the data? What trends are suggested by the data.**

**Path: Tableau - Program Review/ Equity - D2. One Year Persistence Rate**

| College | Success | Retention |
|---|---|---|
| 2019-2020 | 70.4 | 84.9 |
| 2020-2021 | 70.3 | 85.2 |
| 2021-2022 | 69.4 | 86.8 |
| Math | | |
| 2019-2020 | 61.8 | 78.4 |
| 2020-2021 | 63.1 | 81.2 |
| 2021-2022 | 63.1 | 81.3 |

Please see comments above.

**Success**

**The following questions refer to data regarding student achievement.**

**What are your set goals for course success? Do your individual course and department rates meet this goal?**

**Helpful Question: If your rates for success are lower than your goals, what are your plans to improve them (200 words or less)?**

**Path: Tableau - Program Review/ Equity - D3. Course Rates by Unit**

| Course | Success 2019-2020 | Success 2020-2021 | Success 2021-2022 |
|---|---|---|---|
| Math 8A | 51.3 | 54.1 | 53.4 |
| Math 8B | 69.5 | 71.4 | 75.8 |
| Math 11 | n/a* | 59.1 | 40 |
| Math 1A | 63.9 | 74.9 | 66.2 |
| Math 1B | 55.9 | 66.1 | 76.9 |
| Math 1C | 76 | 70 | 87.8 |
| Math 5 | 60.3 | 58 | 59.7 |

Success rates are not at the level we would like, particularly in Precalculus. The math group is developing curriculum to revise the Precalculus sequence. Also, curriculum for a Calculus support class is being developed.

**How many students did your area serve (if you don't have an exact count, please provide an estimate)? How did they perform in comparison to those that did not use your services, if applicable? Given this information, how has your service or area supported student success and retention over the past three years (200 words or less)?**

**See Success and Retention dashboard in Tableau's Program Review section.**

| Year | Math Headcount |
|---|---|
| 2019-2020 | 3543 |
| 2020-2021 | 2932 |
| 2021-2022 | 2265 |

There has been a significant decrease in the number if students taking math courses. Math and Natural Science majors enrollment in math courses has a decline from a peak of 578 in 2019-2020 to 451 in 2021-2022. But the biggest factor in the overall decline of math enrollments is really the decrease in enrollment from Liberal Arts and Humanities majors. The enrollments in math for Liberal Arts and Humanities majors went from 797 in 2016-27 to 158 in 2021-22. If you look at ALL subjects, the total enrollments for Math and Natural Science majors went from 2588 in 2016-17 to 2162 in 2021-22 . But the total enrollment for Liberal Arts and Humanities Majors went from 7096 to 2058 in the same period. In addition, business majors taking math courses declined from 1022 to 502 in the same period of time.

## Equity

Equity

**Gavilan College has identified the following populations as experiencing disproportionate outcomes: Males, African American, Native American, Students with Disabilities and Foster Youth.**

**For EOPS/ CalWORKs, MESA, TRiO, Puente, and VRC: LOCATE Success and Retention dashboard in Tableau's Program Review section. Examine your equity results over the last three years. If there are differences in success rates and/ or retention across groups, comment on any differences in success rates across groups. Helpful Questions: What current factors or potential causes can be connected to these areas of disproportional impact? How might your program or department address student equity gaps (200 words or less)?**

**For all other areas, how can your area help increase disproportionate student success? Contact your support team for any needed assistance in interpreting these data (200 words or less).**

**Please find Equity information in Tableau's Success and Retention dashboard.**
**Contact your support team for any needed assistance in using Tableau.**

| Population | Success 2019-2020 | Success 2020-2021 | Success 2021-2022 |
|---|---|---|---|
| Female | 63.9 | 66.8 | 63.4 |
| Male | 59.7 | 59.1 | 63.1 |
| White | 65.7 | 70.6 | 68.4 |
| Latinx | 59 | 60.7 | 60.8 |
| Asian | 69.6 | 86.4 | 83 |
| African American* | 60.4 | 51.8 | 57.5 |
| Native American** | 45.5 | 37.5 | 100 |

*sample size < 30

** sample size < 6

Provide targeted support: Math faculty can offer targeted support to students who may be struggling in math classes. This can include embedded tutoring, AEWs, and other forms of academic support to help students gain the skills and confidence they need to succeed.

Create a supportive learning environment: Math faculty can foster a supportive and inclusive learning environment that encourages all students to participate and engage in math. This can include promoting diversity, equity, and inclusion in the classroom, and encouraging active learning and peer-to-peer collaboration.

Use effective teaching strategies: Math faculty can use effective teaching strategies such as differentiated instruction, scaffolding, and formative assessment to meet the diverse learning needs of students. This can help ensure that all students have the opportunity to succeed in math classes.

Address math anxiety: Math faculty can help address math anxiety by creating a safe and supportive classroom environment, providing mindfulness techniques and other supportive measures to help students overcome their fears and succeed in math.

**Our Equal Employment Opportunity (EEO) Plan States**

**"Ensuring equal employment opportunity involves creating an environment that fosters cooperation, acceptance, democracy, free expression of ideas and is welcoming to persons of all gender expressions, persons with different abilities, and individuals from all ethnic and other groups protected from discrimination."**

**What is your area doing to support district efforts in creating an inclusive college environment? With what departments are you partnering? Did you identify barriers and institute change? How is you creating/ ensuring diversity in your department or in the classroom?**

**Some examples might be sponsoring cultural events and diverse speakers on issues dealing with diversity, exploring how to infuse diversity into the classroom and curriculum, integrating diversity into the evaluation of employees, promoting learning opportunities and personal growth in the area of diversity, or evaluating how the physical environment can be responsive to diverse employee and student populations.**

- Collaboration of faculty in STEM focused GE courses
- Humanizing STEM professional development
- Alumni speakers
- STEM Open House
- Partner with SJSU and CSUMB to provide faculty speakers
- ACCESS program
- Baskin Engineering Day
- MESA
- SACNAS

**Find your Distance Education success information. If distance education is offered, consider any gaps in success rates between distance education and face-to-face courses. Do you notice any trends? Do these rates differ?**

**Path: Tableau Program Review/ Equity D9. Course Success Rates Locate your department. Filter by Delivery Methods**

**Helpful question: If disparity exists, how do you plan on closing the achievement gaps between distance education and face-to-face courses (300 words or less)?**

## Learning and Area Outcome

Have you reviewed all of your Service Area Outcomes (SAOs) to ensure that they remain relevant for evaluating the performance of your area?

**Are your SLOs, PLOs, SAOs, and ILOs mapped in CurriQunet?**

No

**Are your SLOs, PLOs or SAOs up-to-date in CurriQunet?**

Yes

**Have all of your SLOs, PLOs or SAOs been assessed in the last five years?**

No

**Have you reviewed all of your SLOs/SAOs to ensure that they remain relevant for evaluating the performance of your program?**
No

**If you answered no to any of the above questions, what is your plan to bring SLOs/PLOs/SAOs into compliance?**
SLO assessment has not been done in any kind of organized way for the last three years.

## Outcome Assessments

Student Learning Outcomes (SLO) or Service Area Outcomes (SAO)
**Review the SLOs or SAOs data located in CurriQunet. What is your department's acceptable achievement score goal for each outcome?**
For the math department, the acceptable achievement score would be 70%.

Institutional Learning Outcomes (ILO)
**How do your SLOs/SAOs support the college ILOs or how do your PLOs support the college ILOs? Be specific.**
PLO 2 (Compare and contrast various mathematical models and then apply the appropriate model to real world problems) seems to align well with ILO 1 (Think Creatively and Effectively)

PLO 3: Describe, compare and contrast various mathematical functions using everyday language and

PLO 4: Describe, compare and contrast various mathematical properties and operations for real and imaginary numbers using everyday-language
seem to align well with ILO 2: Communicate Effectively.

We don't have PLOs that align closely with the other ILOs (Practice Social Responsibility and Cultivate Well-Being).

We could consider adding to/adapting our PLOs to connect with these latter ILOs.

**Are you meeting your SLO/SAO success goals? What patterns stand out in your results? If your SLO/SAO results are lower than your goals, what are your plans to improve them?**
SLO data has not been collected or reported for over 3 years

## Curriculum and Course Offerings Analysis

**Are there plans for new courses or educational awards (degrees/certificates) in this program? If so, please describe the new course(s) or award(s) you intend to propose (200 words or less).**

- Support class for Math 1A (Math 1AX)
- New College Algebra course (Math 15)
- Revamped curriculum for Math 8A, 8B and 11
- No longer offering pre-transfer level courses
- Rewrote curriculum for math bootcamps
- Incorporate data science elements into existing Statistics course
- Develop Data Science certificate

**Provide your plans to either inactivate or teach each course not taught in the last three years (200 words or less).**
Deactivate Math 400 and Math 430. We would like ot keep Math 240 and 242 in the "parking lot."

**Consider and analyze your location, time, and delivery method trends. Are classes offered in the appropriate sequence/ available so students can earn their degree or certificate within two years? Are courses offered face-to-face as well as have distance education offerings? Are they offered on the main campus as well as the off-site areas? Different times of day? (300 words or less).**
To support math students in meeting the general education transfer-level math requirement, Math courses are offered in multiple modalities including face-to-face, face-to-face with co-req support class, full semester hybrid, 8-week accelerated, fully online asynchronous, summer face-to-face and summer online. Math 5 is offered on the main campus as well as Hollister. CLasses are offered throughout the day and evening.

For STEM majors, classes are offered in the appropriate sequence; at various times; however, completion in two years is dependent on preparation prior to entering Gavilan.

## Program and Resource Analysis

**Please list the number of Full and Part Time faculty, staff and/ or managers/ administrator positions in this program over the past three years. Focus on your individual program.**

Program and Resource Analysis

1. **2018**

   **How many students did your area serve in this year (if you don't have an exact count, please provide an estimate)?**
   3455

   **Full Time Faculty**
   6

   **Part Time Faculty**
   21

   **Full Time Staff**
   1

   **Part Time Staff**
   2

   **Full Time Mgr/Admin**
   1.00

   **Part Time Mgr/Admin**
   0.00

2. **2019**

   **How many students did your area serve in this year (if you don't have an exact count, please provide an estimate)?**
   3543

   **Full Time Faculty**
   5

   **Part Time Faculty**

20

**Full Time Staff**
1

**Part Time Staff**
2

**Full Time Mgr/Admin**
1.00

**Part Time Mgr/Admin**
0.00

3. **2020**

**How many students did your area serve in this year (if you don't have an exact count, please provide an estimate)?**
2932

**Full Time Faculty**
5

**Part Time Faculty**
17

**Full Time Staff**
1

**Part Time Staff**
2

**Full Time Mgr/Admin**
1.00

**Part Time Mgr/Admin**
0.00

**Faculty Percentages**

# Percentage Full to Part Time Faculty

Year:2018
FT = 22.20%
PT = 77.80%

Year:2019
FT = 20.00%
PT = 80.00%

Year:2020
FT = 22.70%
PT = 77.30%

**How have and will those with reassigned time, grant commitments and activity, projected retirements and sabbaticals affect personnel and load within the past in the next three years? What future impacts do you foresee (200 words or less)?**
One of our full-time faculty has 60% reassign time for STEM grant activities undone will be on sabbatical in Fall 2023. This should not pose a problem as we are offering significantly fewer sections and we have more part-time faculty than their are available classes.

**Additional Comments**

## Evaluation of Resource Allocations

**List the resource allocations from all sources (e.g., annual college budget request appropriations, Guided Pathways funds, grant funds, etc.) received in the last three years. For annual college budget request appropriations, reference your previous three-year plan and annual updates.**

**Please evaluate the effectiveness of the resources utilized for your program. How did these resources help student success and completion? For college budget request appropriations, list the result of the evaluation strategy outlined in your previous three-year plan and annual updates. For all other sources of funding, list the results of the evaluation strategy contained within the program or grant plan.**

**Did you receive additional funds?**
No

## Program Productivity

Program Productivity Measurements
Determine the number of students you assist annually. Using the data provided by the business office, calculate your average cost effectiveness per student. **If you do not have student contact, please fill out Total allocated budget and Total spending.**

**Year and Student count**

**Evaluate your program costs. Are your costs in alignment with your budget? If not, what improvements can be made? Please explain any trends in spending, inconsistencies and unexpected results.**

## Integrated Planning and Initiatives

**What other areas is your program partnering with (i.e. guided pathways, grant collaboration, etc.) in new ventures to improve student success at Gavilan College? What is the focus of this collaboration? Helpful question: What are the department and your Integrated Planning/ Guided Pathways partners' plans for the next three years (200 words or less)?**

STEM grant collaboration

Purpose of STEM III was to establish GP framework in STEM

- STEM Counselor
- STEM Academies
- STEM focused GE courses

STEM IV focuses on engineering pathways

- Engineering academies
- Communities of practice for Math 8A/B
- Project based learning in Precalculus
- Humanizing STEM faculty professional development

## Other Opportunities and Threats

**Review for opportunities or threats to your program, or an analysis of important subgroups of the college population you serve. Examples may include environmental scans from the Educational Master Plan, changes in matriculation or articulation, student population, community and/ or labor market changes, EMSI data and etc. Helpful Question: What are the departmental plans for the next three years (200 words or less)?**
N/a

**What are you discovering about instruction and/or services in a remote environment that you would want to maintain post-pandemic?**

- Increased online/hybrid offerings
- Continued use of Canvas in all classes
- Ability to meet online via Zoom in case of campus closure or illness

**What kinds of issues are exacerbated or emerging that are likely to remain, unless addressed?**

- AB 705/1705
- Decreasing enrollments in math courses
- Level of student preparation

## Additional Questions

**Please consider providing answers to the following questions. While these are optional, they provide crucial information about your equity efforts, training, classified professional support, and recruitment.**

**1. Does your division (or program) provide any training/mentoring for faculty and/ or classified professionals regarding professional development?**
Humanizing STEM

Communities of practice for Precalculus

**2. If there is a need for more faculty and/ or classified professional support in your area, please provide data to justify request. Indicate how it would support the college mission and college goals for success and completion.**
Need for permanent staff in Math Lab

**3. What, if anything, is your program doing to assist the District in attracting and retaining faculty and classified professionals who are sensitive to, and knowledgeable of, the needs of our continually changing constituencies, and reflect the make-up of our student body?**
Bring in former students to staff Math Lab/STEM Center

**4. Are there program accomplishments/ milestones that have not been mentioned that you would like to highlight?**
N/a

**Please share any recommendations for improvements in the Program Integrated Plan and Review process, analysis, and questions. Your comments will be helpful to the PIPR Committee and will become part of the permanent review record.**
N/a

## Goals

Three-Year Program Plan Goals

1. **Increase the number of students completing calculus sequence by 10% using Fall 2019 baseline.**

   **Connection of Goal to Mission Statement, Strategic Plan (http://www.gavilan.edu /administration/master_plan/docs/SP_GoalsStrategiesDraft-final.pdf) and SAO Results**
   Connection of Goal to Mission Statement: STEM degrees provide upward mobility for our students, particularly in our geographic area

   Proposed Activity to Achieve Goal

   - Additional support for students entering Statistics, precalculus and calculus
   - Support courses for Math 1A and Math 11
   - Improve onboarding/placement process
   - Develop placement process in compliance with AB 1705
   - Math faculty facilitate AEWs for Precalculus/Calculus

   **Proposed Activity to Achieve Goal****
   See above

   **Responsible Party**
   Math faculty

   **Fund amount requested. If a collaboration, what % required from each partner?**
   $0

   **Total Three Year Resource Allocation Request**
   0

   **Timeline to Completion Month / Year**
   Fall 2025

   **How Will You Evaluate Whether You Achieved Your Goal**
   Greater success and retention in gateway transfer level math courses

2. **Improve onboarding process around math placement**

   **Connection of Goal to Mission Statement, Strategic Plan (http://www.gavilan.edu /administration/master_plan/docs/SP_GoalsStrategiesDraft-final.pdf) and SAO Results**
   Connection of Goal to Mission Statement: Ensure students have the underlying competencies to be successful in their math course

   Proposed Activity to Achieve Goal

   - Increase awareness of math options
   - Improve messaging to students
   - Increase marketing/outreach

- Enhance placement process to “comply” with AB 1705

**Proposed Activity to Achieve Goal****
See above

**Responsible Party**
Math faculty

**Fund amount requested. If a collaboration, what % required from each partner?**
$0

**Total Three Year Resource Allocation Request**
0

**Timeline to Completion Month / Year**
Fall 2025

**How Will You Evaluate Whether You Achieved Your Goal**
Greater success and retention in gateway transfer level math courses

3. **Explore different modalities for STEM and SLAM math courses (e.g. flipped classrooms, hyflex, asynchronous offerings of Precalculus/Calculus)**

**Connection of Goal to Mission Statement, Strategic Plan (http://www.gavilan.edu /administration/master_plan/docs/SP_GoalsStrategiesDraft-final.pdf) and SAO Results**
Connection of Goal to Mission Statement: Improve equity and inclusion by providing multiple modalities to support students with varying needs and constraints

Proposed Activity to Achieve Goal

- Form communities of practice
- Professional development
- Training in classroom technology for hyflex instruction
- Evaluation of various hyflex models
- Get more math courses through the POCR process

**Proposed Activity to Achieve Goal****
See above

**Responsible Party**
Math faculty

**Fund amount requested. If a collaboration, what % required from each partner?**
$0

**Total Three Year Resource Allocation Request**
0

**Timeline to Completion Month / Year**
Fall 2025

**How Will You Evaluate Whether You Achieved Your Goal**
We will have identified which modalities best align with specific course offerings and student needs.

4. **Investigate open-source textbooks options for possible implementation into our courses**

**Connection of Goal to Mission Statement, Strategic Plan (http://www.gavilan.edu /administration/master_plan/docs/SP_GoalsStrategiesDraft-final.pdf) and SAO Results**

Connection of Goal to Mission Statement: Reducing the cost of education makes it more equitable and accessible

Proposed Activity to Achieve Goal

- Professional development
- Provide compensation to faculty for incorporating OERs into their courses or converting their courses to ZTC
- Expand lending library of math textbooks

**Proposed Activity to Achieve Goal****
See above.

**Responsible Party**
Math faculty

**Fund amount requested. If a collaboration, what % required from each partner?**
$0

**Total Three Year Resource Allocation Request**
0

**Timeline to Completion Month / Year**
Fall 2025

**How Will You Evaluate Whether You Achieved Your Goal**
Increased proportion of ZTC math class offerings.

## Executive Summary

**Please provide a brief executive summary regarding program trends and highlights that surfaced in the writing of this report. Summarize, using narrative, your program goals for your next three years. Your audience will be your Peer Review Team, the PIPR Committee, President's Cabinet, Dean's Council, ASGC, Academic Senate, Budget Committee and Board of Trustees (300 words or less).**
Due to the impact of the pandemic and elimination of pre-transfer level math courses, the number of students in our classrooms has decreased and the number of underprepared students has increased. This continuing challenge, conflated with compliance to AB 705/1705, creates the need for ongoing forms of concurrent academic support, motivation, and encouragement. Increasing the number of students completing the calculus sequence will require more wrap-around support services such as embedded tutoring, designated counseling, and just-in-time remediation through cohort support classes. Faculty will require professional development in inclusive teaching practices, equity, and Humanizing STEM. Improve onboarding process in math placement by investigating and improving alignment of HS math curricula with Gavilan math curricula. Improve communication and marketing to students around the placement process and course offerings. Improve communication with local HS faculty and administrators to more fully understand integrated math curricula offered at some (but not all) area high schools. CAP Success Teams will develop a CAP specific plan for the process of pathway onboarding. The Natural Science Department has postponed offering STEM courses using a Hyflex modality while they investigate the efficacy of this modality. Hyflex offerings are part of a larger institutional dialogue, including identifying the problem being solved by the Hyflex modality, required instructor training, classroom equipment standards, and quality standards. Math faculty recognize the continued high cost of textbooks as a barrier that impacts student success. The college has received additional funds to provide professional development support and incentive funding for faculty to convert their

courses to ZTC. Math faculty will work with our ZTC Coordinator to investigate the adoption and implementation of ZTC and to incorporate OER textbook/course resources into their classes.

## Attach Files

**Attached File**