

ANNUAL PROGRAM REPORT

College	Science
Department	Mathematics
Program	BS and MS
Reporting for Academic Year	2022-23
Last 5-Year Review	2022-23
Next 5-Year Review	2027-28
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I. SELF-STUDY

A. **Five-Year Review Planning Goals**

- *Updates to Math 118* (Mathematics for the Arts and Humanities) - development of course materials and alignment/collaboration with the INSPIRE program in CLASS.
- *Community of Practice (CoP) and Assessment CoP (ACoP)*: develop our ACoP to support engagement around active assessment strategies in lower and upper division math courses. This project has been funded to start in January 2023, with CoPs running in AY 2023-2024 and AY 2024-2025.
- *Data Reports*: At the start of each semester, we want to be able to send out a message with data on the equity gaps and DFW rates for all of our multi-section, lower division classes. This is a precursor to distributing more instructor specific data along with reflection questions for instructors, to encourage individual instructors to look at their DFW and opportunity gaps. We aim to develop post-semester reflection questions to provide to instructors that can potentially prompt change in practice
- *Master's Program*: Our enrollment has become precipitously low and thus, we need to be very intentional about increasing student interest, both internally and externally, in our Math Master's program.
- *Data Science Major*: we will support the new Data Science major, working in collaboration with other departments to create new courses and weave in existing courses to make this a viable program.

B. **Progress Toward Five-Year Review Planning Goals**

Updates to Math 118 (Mathematics for the Arts and Humanities) - we continue to communicate with the leaders of the INSPIRE program to coordinate scheduling of the sections of Math 118/118E, reserving seats for their students. Last year we began the process of overhauling the course materials, creating Units that instructors choose to teach. We have units on Probability, Network Theory, Measuring Inequality, Math Critiquing, Math and Art, Graphing, and Climate Change.

Community of Practice (CoP) and Assessment CoP (ACoP): Our COP involving the STEM pathway courses (Math 115E, Math 120, Math 125, and Math 130) continues to meet monthly. We maintain good attendance and lively interactions among all instructors. Topics of discussion include building classroom community, alternative assessments, ways to engage students, closing the opportunity gaps, DEI issues, pacing of content, and more. The Dean's Office supports one WTU release for a CoP Coordinator, and key Course Coordinators participate in planning the monthly agendas. The grant entitled "*Active Assessment Supported By Communities of Practice in Mathematics*" supports an Assessment Community of Practice (ACoP) for instructors focused on implementing assessments aligned with the values and practices of active learning. The first iteration of the ACoP is running from Summer 2023-Spring 2024 and consists of 9 faculty members (tenure-track and lecturer faculty) committed to implementing active assessment strategies in mathematics courses at CSUEB.

Data Reports: At the start of each semester, we want to be able to send out a message with data on the equity gaps and DFW rates for all of our multi-section, lower division classes. This is a precursor to distributing more instructor specific data along with reflection questions for instructors, to encourage individual instructors to look at their DFW and opportunity gaps. We aim to develop post-semester reflection questions to provide to instructors that can potentially prompt change in practice.

Although we were not able to begin these particular data reports, we did make headway on another aspect of increasing satisfaction for students. We began distributing a survey in all STEM pathway courses that gave an overview of the particular class in the hopes that students would feel as if they are placed in the correct class.

Masters Program: Due to a steady linear decrease in the enrollment in our Math Master's program, we need to take a proactive role in increasing student interest. We have several plans for increasing enrollment. Although many of our students come from our undergraduate program, it is ad hoc. We are creating a bridge program targeted to our undergraduates to consider starting with graduate courses during their final semester of their bachelor's degree, and to have one-on-one meetings with faculty to talk about the Master's program. Additionally, we are advertising more heavily, both virtually and in person, at graduate fairs.

Data Science Major: we will support the new Data Science major, working in collaboration with the Statistics & Biostatistics and Computer Science Departments to create new courses and weave in existing courses to make this a viable program. The syllabus for two new math courses, "Math for Data Science 1 and 2" have been created, with the content planned out. These courses will be taught for the first time in AY 2024-25 when the program begins.

C. Program Changes and Needs

Curriculum: Our lower division courses comprising College Algebra, Precalculus, Calculus 1, 2, and 3, and Finite Math for Business are well coordinated. We have significantly reduced the cost for our students by moving to XYZ homework, which costs \$45 for a three-year access code, essentially the math life for a student at CSUEB. Additionally, different groups of faculty and instructors have collaborated on sets of guided notes which are printed in spiral-bound notebooks and sold for \$19 per course. Pacing of material and suggested activities are communicated via the use of an online dynamic calendar in many of these courses, and resources are readily shared among all instructors. Alternatives to high-stakes, timed exams are discussed during coordination meetings and the CoP meetings. All instructors at all levels, tenure-track, lecturers, graduate TAs, buy into incorporating active learning strategies into their classrooms and building community among the students. Additionally, we all work well with the Learning Assistants embedded in the classroom.

Students: Five of the eight tenure track faculty work with several students, usually a mixture of undergraduate and graduate, in a research capacity. Additionally, we created a course called *Independent Research* (Math 480), separate from

Independent Study, for mathematical reading groups led by faculty members. We generally have several of these occurring each semester. Overall, the opportunities for students to engage in research opportunities has expanded. We are cognizant of opening up these opportunities to all students, with a wide variety of educational backgrounds and diversity. Our goal is to help as many students as possible understand that they can be mathematicians and what it means to “do math.”

Faculty: In AY 2022-23 we hired a new faculty member whose research area is applied math and data science, areas in which we aim to grow. Both Dr. Wolitzer and Dr. Malek finished their FERP programs. We have ten tenure-track faculty on the roster. However, two are on leave for AY 2023-24, including the newest hire. We always aim to have our tenure track faculty teach at least one lower division course each year, and rotate who teaches the graduate courses. As we build the Data Science Major for undergraduates, with the addition of several new math courses, our faculty may be spread thin to cover all the classes, leaning more heavily on lecturers.

Staff: We were fortunate in AY22-23 to have an ASC I/Office Manager for Mathematics. Budget cuts have meant cutting back on student assistants for staff. Over the Summer 2023 the move to the Hub organization has been a bit of an upheaval and relearning process for all faculty, instructors, and staff.

Resources: The current location and size of the STEM LAB is hardly sufficient to support students in Math 110(E), Math 115E, Math 118(E), Math 120, Math 125, Stat 100, Stat 100A, Stat 101, and Stat 101A. Due to the expanding role and visibility of the STEM LAB, many TAs, lecturers, and some faculty hold office hours there. We are eager for when the new Applied Sciences building opens and the STEM LAB relocates to a bigger location.

Program Assessment: We plan on continuing to use our current process of re-examining appropriate final exam problems using an RVF rubric. We have reduced the number of courses we assess per year with a focus on mastery in all areas.

Other: In AY2022-23 we began work on the NSF grant to advocate for Achieving Critical Transformations in Undergraduate Programs in Math (ACT UP Math) centered around issues of diversity, equity and inclusion. The two goals determined by working members of the Networked Improvement Community were (1) improve student relationship with math by helping students to see the value and use of math through applications, and (2) invoke an experimental guided self-placement into lower division math courses and provide short in-class presentations regarding the benefit of choosing that particular math course. We also received funding from the California Learning Lab which will help us implement more active learning and new “big ideas” approach in precalculus. This project includes San Francisco State, Merit College, Berkeley City College, the College of Alameda,

II. SUMMARY OF ASSESSMENT

Mathematics Bachelor's of Science Assessment Report 2022-23

A. BS Program Learning Outcomes (PLO)

<i>Students graduating with a BS degree in Mathematics will be able to:</i>	
<i>PLO 1</i>	<i>Apply the definitions, techniques and theorems of mathematics. (ILO Thinking and Reasoning: Quantitative Reasoning.)</i>
<i>PLO 2</i>	<i>Use mathematics to understand, explain and/or solve problems beyond a particular course.</i>
<i>PLO 3</i>	<i>Creatively conjecture and rigorously write, analyze and critique proofs.</i>
<i>PLO 4</i>	<i>Communicate mathematics effectively. (ILO Communication: Oral Communication.)</i>

B. Program Learning Outcome(s) Assessed

<i>PLO 1</i>	<i>Apply the definitions, techniques and theorems of mathematics. (ILO Thinking and Reasoning: Quantitative Reasoning.)</i>
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C. Summary of Assessment Process

Instrument(s): The department used a final concept map and a rubric. The rubric was used to score the map in the areas of readability, validity and fluency.

Sampling Procedure: The course for this year's assessment was chosen by the department when we created our long-term assessment plan. A concept map was identified as appropriate to assess PLO 1.

Sample Characteristics: The course selected is a course required for all majors. The concept map assignment was selected carefully to ensure it included essential course content.

Data Collection: Dr. Moruzzi provided a random sample of the Concept Maps to the department assessment coordinator. The map was scored by the assessment coordinator for readability, validity and fluency using the rubric found in appendix A.

Data Analysis: Course Assessed: *MATH 320 Abstract Algebra I*

Math 320, SLO 1/Mastered (Students)

Course Concept Map

	<i>Missing</i>	<i>Emerging</i>	<i>Developing</i>	<i>Mastering</i>
<i>Readability</i>	0%	0%	25%	75%
<i>Validity</i>	0%	0%	50%	50%
<i>Fluency</i>	0%	0%	75%	25%

These scores indicate 75% of the students have mastered the ability to write a readable concept map, 50% mastered and 50% are developing the ability to write a valid map, and 25% of the students mastered the ability to write a concept map with fluency. These scores indicate that most of the students have developed or mastered the ability to write a readable concept map, half of the students have mastered the ability to write a valid map and all of the students are developing or have mastered the ability to write a map with fluency. The department should consider strategies to increase the percentage of students mastering writing a valid and fluent concept map.

Main Findings: This year most students performed well at all three levels, yet there was still a high percentage of students who have not mastered their work. The department needs to find ways to increase performance at all levels.

Recommendations for Program Improvement: The department needs to work on setting and communicating to instructors and students the essential topics for each course and how to include validity and fluency practice throughout the coursework.

Next Step(s) for Closing the Loop: Since there have been four years of semesters at CSUEB now, the department is updating expanded syllabi for semester courses which will include more details regarding course topics, depth of study, grading guidelines, and assessment expectations at the introductory, developing or mastery level for readability, validity and fluency in student work. Professors will be encouraged to share the assessment rubrics with their students.

Other Reflections: The work described above is a huge project. We have guidelines ready but did not have time to do a revisit this past summer. We will need to continuously improve our course packets for instructors.

D. Assessment Plans for Next Year: 2023-2024

Year 2: 2023-2024	
1. Which PLO(s) to assess	PLO 2
2. Is it aligned to an ILO?	No
3. If yes, list ILO.	N/A
4. Course name and number	Math 310 Linear Algebra Theory
5. SLO from course	Students who successfully complete MATH 310 will be able to apply the definitions, techniques and theorems of Linear Algebra Theory.
6. Assessment activity	A sampling of student solutions to two typical final exam questions will be viewed by the mathematics assessment committee and scored using a rubric.
7. Assessment Instrument	Applying Mathematics Rubric
8. How data will be reported	Quantitative
9. Responsible person(s)	Math Assessment Committee
10. Time (which semester(s))	Spring 2024

<i>11. Ways of closing the loop</i>	Data will be reported in the Mathematics Department Annual Report and discussed in faculty meetings to continuously improve the program.
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**Mathematics Master of Science
Assessment Report 2022-2023**

A. M.S. Program Learning Outcomes (PLO)

<i>Students graduating with a MS degree in Mathematics will be able to:</i>	
<i>PLO 1</i>	<i>Evaluate and create proofs in graduate level mathematics using the fundamental definitions and theorems. (ILO Thinking and Reasoning: Quantitative Reasoning.)</i>
<i>PLO 2</i>	<i>Create solutions to problems using techniques in graduate level mathematics.</i>
<i>PLO 3</i>	<i>Communicate Graduate Level Mathematics Effectively. (ILO Communication)</i>

B. Program Learning Outcome(S) Assessed

<i>PLO 2</i>	<i>Create solutions to problems using techniques in graduate level mathematics.</i>
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C. Summary of Assessment Process

Instrument(s): The department used two comprehensive exam questions and a rubric. The rubric was used to score the exam questions in the areas of readability, validity and fluency.

Sampling Procedure: Two comprehensive exam questions were identified as typical problems for the exam that demonstrates the PLO to be assessed. The problems were chosen by the assessment team.

Sample Characteristics: The course selected is a course required for all math master's students. The exam question was selected carefully to ensure it included essential program content. This selection was done during one of the assessment team meetings.

Data Collection: Comprehensive exams were collected by the department assessment coordinator. The problem was scored by the faculty for readability, validity and fluency using the rubric found in Appendix A.

Data Analysis: Course Assessed: *MATH 692 Graduate Capstone*

Math 692, PLO 2/Masters

Problem 1: Consider the equation $x = (x - 3)^2 - \cos x$ (a) Prove that the equation has exactly two positive solutions. (b) Let α be the smaller of the two solutions. Use Newton's Method to find an approximation of α with an absolute error of less than 10^{-5} . (c) Prove that your approximation is sufficiently accurate.

	<i>Missing</i>	<i>Emerging</i>	<i>Developing</i>	<i>Mastering</i>
<i>Readability</i>	0%	20%	20%	60%

<i>Validity</i>	0%	20%	40%	40%
<i>Fluency</i>	0%	20%	40%	40%

These scores indicate that only 40% of the students have mastered the ability to write a valid solution, 60% mastered writing a readable solution and 40 have mastered writing a fluent solution. Only 20% of the students are still emerging in all three areas. The department should consider strategies to increase the percentage of students mastering graduate level problem solving.

Problem 2: Define an alternative topology on \mathbb{R} , called the upper limit topology and denoted by \mathbb{R}_{UL} , generated by a basis consisting of all sets of the form $(a, b] = \{x \in \mathbb{R} \mid a < x \leq b\}$. Define the set $E \subset \mathbb{R}_{UL}$ to be $E = (2, 5) = \{x \in \mathbb{R} \mid 2 < x < 5\}$.

(a) Is 2 a limit point of the set E in \mathbb{R}_{UL} ? Prove your answer directly from the definition above.

(b) Is the set E open in \mathbb{R}_{UL} ? Prove your answer. (c) Is the set E closed in \mathbb{R}_{UL} ? Prove your answer.

	<i>Missing</i>	<i>Emerging</i>	<i>Developing</i>	<i>Mastering</i>
<i>Readability</i>	0%	0%	0%	100%
<i>Validity</i>	0%	0%	0%	100%
<i>Fluency</i>	0%	0%	25%	75%

These scores indicate that 100% of the students have mastered the ability to write a readable and valid solution and 75% of the students have mastered writing fluent solutions. Also 25% of the students are developing writing a fluent solution.

Main Findings: This year all of the students mastered writing a valid solution to a pure problem but only 40% of the students could do so for an applied problem.

Recommendations for Program Improvement: The department needs to work on ensuring that strong problem solving and writing skills are developed within the coursework of the program. High expectations need to be set and communicated to the graduate students.

Next Step(s) for Closing the Loop: The department is updating expanded syllabi for semester courses which will include more details regarding course topics, depth of study, grading guidelines, and assessment expectations at the introductory, developing or mastery level for readability, validity and fluency in student work. Professors will be encouraged to share the assessment rubrics with their students. This is time consuming and ongoing work. The department is also revisiting the timing for the different comprehensive exams.

Other Reflections: The work described above is a huge project. We have guidelines ready and did a revisit this past summer but we will need to continuously improve our course packets for instructors.

D. Assessment Plans for Next Year

Year 2: 2023-2024	
1. Which PLO(s) to assess	PLO 3
2. Is it aligned to an ILO?	Yes
3. If yes, list ILO.	Communication
4. Course name and number	MATH 692 Graduate Mathematics Capstone
5. SLO from course	Students who successfully complete MATH 692 will have mastered communicating mathematics in at least four areas of graduate level mathematics.
6. Assessment activity	Comprehensive Exams
7. Assessment Instrument	Re-score Comprehensive Exam questions using the Readability, Validity and Fluency Rubric
8. How data will be reported	Quantitative
9. Responsible person(s)	Math Assessment Committee
10. Time (which semester(s))	Spring 2024
11. Ways of closing the loop	Data will be reported in the Mathematics Department Annual Report and discussed in faculty meetings to continuously improve the program.

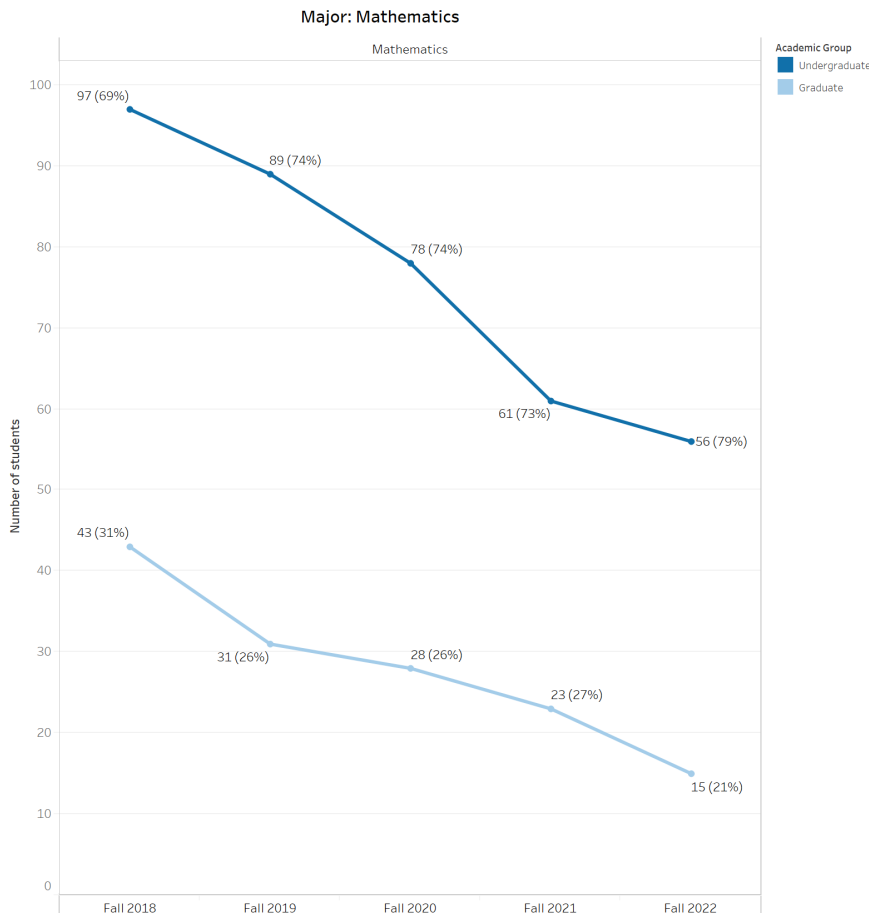
III. DISCUSSION OF PROGRAM DATA & RESOURCE REQUESTS

A. Discussion of Trends & Reflections Notable Trends; Reflections on Trends and Program Statistics:

Enrollment: We continue to see a drop in our enrollment, both in the number of undergraduate majors and graduate students. This lower enrollment is being reflected in many other four-year institutions, as well as the community colleges, thus affecting our transfer rates. Politically, there is more questioning of the need and financial payout for getting a bachelor's degree, and more students are entering the workforce without it. Additionally, the pandemic negatively affected the K-12 teaching environment so fewer college students are interested in becoming high school math teachers at this time.

We are making it straightforward for computer science majors to add on the math minor by using several courses they need for their own major, such as Math 225. This is just one example of how we have noticed an increase in the number of math minors as we make it more of an attractive program. The College of Business and Economics is proposing a new BS in Business Analytics which will require Math 130 Calculus I, which will boost our enrollment in the math STEM pathway courses (115E, 120/125, 130). Math faculty continue to offer student-accessible colloquiums and run recruitment activities to grow our major. Five of the eight faculty currently teaching are working with students on student research projects. These projects are essential to making the majors attractive to a diverse student body and to our retention efforts.

With the addition of the new Data Science major starting in Fall 2024, we hope to attract more students looking for a mathematically rigorous data science degree, for which job prospects in the region, and nationally, are very strong. This type of program is becoming more and more common and there are resources produced by professional organizations to support this work. Our department has several programs and scholarships for “future teachers” (including the NSF NOYCE grant and the MSTI program of scholarships, workshops, and pay for working with mentor teachers in K-12 classrooms) and offers an accredited single subject waiver program that is attractive to students considering a career teaching high school. We plan to continue to leverage this strength and support and encourage our Mathematics BS students to pursue teaching credentials at CSU East Bay. We continue to stress teaching opportunities for our graduate students, many of whom land coveted tenure-track positions at local community colleges based, in part, on the opportunities we provide. With the elimination of developmental math, our students now start by teaching “co-requisite” activity components and those who demonstrate strong skills in the classroom are able to move up to teaching “parent” components within a year. They must also all take Math 605: *Teaching Math and the University Level*. While continuing to support our future community college MS students, we will also look at alternative recruitment strategies and explore computational/data science options at the graduate level. We also hope to begin more intentional outreach to admitted students, and admissions counselors, to emphasize the strengths of our programs.



Mathematics: Concentration											
		Fall 2018		Fall 2019		Fall 2020		Fall 2021		Fall 2022	
		n	%	n	%	n	%	n	%	n	%
Undergraduate		35	36%	60	67%	61	78%	50	82%	50	89%
	Applied Mathematics	22	23%	10	11%	7	9%	5	8%	2	4%
	Mathematics Teaching	32	33%	15	17%	9	12%	5	8%	4	7%
	Option A-Pure Mathematics	8	8%	4	4%	1	1%	1	2%		
	Total	97	100%	89	100%	78	100%	61	100%	56	100%
Graduate		22	51%	24	77%	25	89%	21	91%	13	87%
	Applied Mathematics	18	42%	5	16%	3	11%	2	9%	2	13%
	Mathematics Teaching	1	2%	1	3%						
	Option I-Pure Mathematics	2	5%	1	3%						
	Total	43	100%	31	100%	28	100%	23	100%	15	100%
Postbaccalaureate										1	100%
	Total									1	100%
Grand Total		140	100%	120	100%	106	100%	84	100%	72	100%

Student Diversity: The data show continuing strong enrollment by Hispanic/Latinx students within the undergraduate Math Major (at least 30% since F18, with a high of 37% in F20). We are excited about the potential to leverage this growth within the context of our HSI status. We are working to more systematically examine any opportunity gaps for these students to hope to also improve our alumni tracking and engagement moving forward.

Mathematics: Race/Ethnicity											
		Fall 2018		Fall 2019		Fall 2020		Fall 2021		Fall 2022	
		n	%	n	%	n	%	n	%	n	%
Undergraduate	Asian	22	23%	16	18%	18	23%	13	21%	13	23%
	Black	7	7%	10	11%	5	6%	2	3%	3	5%
	International	2	2%	3	3%	2	3%	2	3%	2	4%
	Latinx	30	31%	30	34%	29	37%	22	36%	17	30%
	Multirace	7	7%	6	7%	3	4%	5	8%	3	5%
	NHPI	2	2%	2	2%						
	Unknown	6	6%	7	8%	5	6%	5	8%	3	5%
	White	21	22%	15	17%	16	21%	12	20%	15	27%
	Total	97	100%	89	100%	78	100%	61	100%	56	100%
Graduate	Asian	6	14%	9	29%	10	36%	8	35%	5	33%
	Black	1	2%	1	3%	1	4%	2	9%	1	7%
	International	7	16%	5	16%	3	11%	2	9%		
	Latinx	9	21%	7	23%	5	18%	4	17%	2	13%
	Multirace	2	5%								
	NHPI	1	2%								
	Unknown	4	9%	1	3%	3	11%	4	17%	5	33%
	White	13	30%	8	26%	6	21%	3	13%	2	13%
	Total	43	100%	31	100%	28	100%	23	100%	15	100%
Postbaccalaureate	International									1	100%
	Total									1	100%
Grand Total		140	100%	120	100%	106	100%	84	100%	72	100%

Mathematics: Sex											
		Fall 2018		Fall 2019		Fall 2020		Fall 2021		Fall 2022	
		n	%	n	%	n	%	n	%	n	%
Undergraduate	Female	51	53%	39	44%	32	41%	29	48%	22	39%
	Male	46	47%	50	56%	46	59%	32	52%	34	61%
	Total	97	100%	89	100%	78	100%	61	100%	56	100%
Graduate	Female	16	37%	15	48%	10	36%	11	48%	6	40%
	Male	27	63%	16	52%	18	64%	12	52%	9	60%
	Total	43	100%	31	100%	28	100%	23	100%	15	100%
Postbaccalaureate	Male									1	100%
	Total									1	100%
Grand Total		140	100%	120	100%	106	100%	84	100%	72	100%

Mathematics: First Generation											
		Fall 2018		Fall 2019		Fall 2020		Fall 2021		Fall 2022	
		n	%	n	%	n	%	n	%	n	%
Undergraduate	FG	55	57%	51	57%	42	54%	39	64%	34	61%
	Non-FG	42	43%	38	43%	36	46%	22	36%	22	39%
	Total	97	100%	89	100%	78	100%	61	100%	56	100%
Graduate	FG	23	53%	13	42%	12	43%	12	52%	7	47%
	Non-FG	20	47%	18	58%	16	57%	11	48%	8	53%
	Total	43	100%	31	100%	28	100%	23	100%	15	100%
Postbaccalaureate	Non-FG									1	100%
	Total									1	100%
Grand Total		140	100%	120	100%	106	100%	84	100%	72	100%

Mathematics: Admit Type											
		Fall 2018		Fall 2019		Fall 2020		Fall 2021		Fall 2022	
		n	%	n	%	n	%	n	%	n	%
Undergraduate	First-time Fr..	51	53%	52	58%	44	56%	36	59%	29	52%
	Transfer	46	47%	37	42%	34	44%	25	41%	27	48%
	Total	97	100%	89	100%	78	100%	61	100%	56	100%
Graduate	First-time Gr..	42	98%	30	97%	27	96%	21	91%	13	87%
	Transfer	1	2%	1	3%	1	4%	2	9%	2	13%
	Total	43	100%	31	100%	28	100%	23	100%	15	100%
Grand Total		140	100%	120	100%	106	100%	84	100%	71	100%

Mathematics: Class Level											
		Fall 2018		Fall 2019		Fall 2020		Fall 2021		Fall 2022	
		n	%	n	%	n	%	n	%	n	%
Undergraduate	Frosh	17	18%	18	20%	11	14%	5	8%	6	11%
	Sophomore	10	10%	8	9%	11	14%	8	13%	5	9%
	Junior	23	24%	28	31%	21	27%	13	21%	16	29%
	Senior	47	48%	35	39%	35	45%	35	57%	29	52%
	Total	97	100%	89	100%	78	100%	61	100%	56	100%
Graduate	Postbacc	43	100%	31	100%	28	100%	23	100%	15	100%
	Total	43	100%	31	100%	28	100%	23	100%	15	100%
Postbaccalaureate	Postbacc									1	100%
	Total									1	100%
Grand Total		140	100%	120	100%	106	100%	84	100%	72	100%

Graduation/Degree Data

Time to Degree Years (and Headcount)				
		Transfer	Masters & Ed.D	First-time Freshmen
Overall		2.3 (10)	2.6 (15)	5.0 (9)
CSCI	Mathematics	2.3 (10)	2.6 (15)	5.0 (9)

APR Coursework Data: Summary: Fall Term as of Census

FTEs, FTEF (instruction), and SFR of all state-side coursework

College	Department	Term & Year														
		Fall 2018			Fall 2019			Fall 2020			Fall 2021			Fall 2022		
		FTEs	FTEF	SFR	FTEs	FTEF	SFR	FTEs	FTEF	SFR	FTEs	FTEF	SFR	FTEs	FTEF	SFR
CSCI	MATH	449.0	17.0	26.5	461.3	17.0	27.2	418.0	15.8	26.5	314.3	15.5	20.3	277.9	11.2	24.9
	Total	449.0	17.0	26.5	461.3	17.0	27.2	418.0	15.8	26.5	314.3	15.5	20.3	277.9	11.2	24.9
Grand Total		449.0	17.0	26.5	461.3	17.0	27.2	418.0	15.8	26.5	314.3	15.5	20.3	277.9	11.2	24.9

A one page overview of the Mathematics department is provided in Appendix C.

B. Request for Resources

1. **Request for Tenure-Track Hires:** Our department is committed to and focused on **Flexibility, Access, Community, and Equity** to support faculty professional work in alignment with department priorities, goals and student engagement. In 2022-23, we updated the Department Equity Action Plan, included in its entirety in Appendix C. When we conducted our search for a tenure-track position in 2022-23, this Equity Action Plan was referred to as part of the questions we asked

all interviewees, and the majority remarked that this was a big draw for them to our department. It was clear from our plan and from the infusion of equity and inclusion ideas in our interview questions that we, as a department, care deeply about these issues.

Looking to the future, of the ten tenure-track faculty members on the roster, two are on leave for AY 2023-24. Of the eight remaining faculty members teaching, two will be on parental leave in Spring 2024, making it a tight fit to cover all the upper division undergraduate and graduate courses. Additionally, we aim to have each tenure track faculty teach at least one lower division course every year, which will be difficult for AY23-24. In the following academic year, Dr. Hann's last semester is Fall 2024, and she will FERP in Fall 2025. In Fall 2023 we had the unusual situation of hiring four new lecturers to help cover courses. This is in addition to our two three-year contract lecturers and five one-year contract lecturers already in the department. With the start of a Data Science program, and one of the Applied Mathematicians, Dr. Olkin, as Chair and on a reduced teaching load, we're having difficulty covering all of the undergrad and graduate applied math courses.

The Math department serves all the STEM majors, as the STEM pathway is a prerequisite for numerous majors in the College of Science. It is important for us to have a healthy mixture of tenure track faculty and lecturers teach these pathway courses, to recruit for our math major, to ensure that elements of equity and inclusion continue to be infused in all courses, and to serve the CSUEB diverse student body.

2. **Resources:** As mentioned above, the move of the STEM LAB to the new Applied Sciences Building will help with the physicality of the lab. The Learning Assistant program is essential to our support of student success in B4-GE Math/QR courses. With active learning such an important component of our courses, it is difficult in classes of 40 students to reach everyone without the extra support of the LAs. The continued support of release for course coordinators for the lower division courses that have many sections (Math 115E, Math 120/125, and Math 130), as well as a coordinator for the Community of Practice program to keep it thriving, are all critical to our ongoing success in serving our students.

IV. APPENDICES

Appendix A - Rubric

CSU East Bay Mathematics, BS
AY 2022-23

Creating Proofs RVF Rubric – Readability, Validity, Fluency

	<i>Missing (0)</i>	<i>Emerging (1)</i>	<i>Developing (2)</i>	<i>Mastering (3)</i>
<i>Readability</i>	<i>Informal or non-mathematical language is used. There is misuse of notation/symbols.</i>	<i>Some improper mathematical language or notation is used.</i>	<i>Mostly proper mathematical language and notation is used.</i>	<i>Proper mathematical language and notation is used.</i>
<i>Validity</i>	<i>Significantly inaccurate or irrelevant statements in definitions, techniques and/or theorems are present. Important information is missing.</i>	<i>Mostly accurate statements in definitions, techniques and/or theorems are present. May include some irrelevant or unjustified statements.</i>	<i>Statements in definitions, techniques and/or theorems are accurate and relevant.</i>	<i>Statements in definitions, techniques and/or theorems are accurate and relevant and connected/deduced correctly.</i>
<i>Fluency</i>	<i>No coherent flow of ideas Listing facts without a sense of how to link them to obtain or apply a valid definition, technique or proof of a theorem.</i>	<i>Partially coherent and organized, but inconsistent. Appeals to intuition. Some unjustified or improperly justified statements/ conclusions in definitions, techniques or proofs of theorems are present.</i>	<i>A correct and essentially complete definition, solution, or proof given. Logic and flow overall sound. Some small gaps in presentation may require “benefit of the doubt.”</i>	<i>A correct and complete definition, solution, or proof given. Elegance or mathematical maturity present.</i>

Appendix B: Mathematics 1 pager

Mathematics Program Insights



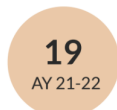
UG MAJORS

Enrollment has declined 42% in the last 5 years



DIVERSITY

Less than half (35.8%) are URM (30.4% Latinx, 5.4% Black)



GRADUATES

31% of undergraduates graduated in 2021-22



AVERAGE TIME TO DEGREE

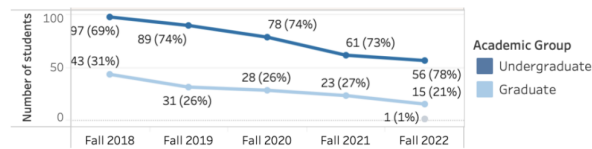
URM Frosh (F): 6.2 Years
URM Transfer (T): 2.5 Years



Non-passing Rates in Highest Enrolled Courses AY 21-22

Course num	Description	n (AY)	Nonpass% (All)	Nonpass% diff (-)	Inequity (URM) ▲	Group_URM	n (URM)	Grades
MATH 120	Precalculus	201	31%	14%	▲	URM	97	38% (37) DFWU, 29% (28) A, 11% (11) B, 22% (21) C, CR
						Non-URM	104	25% (23) DFWU, 20% (19) A, 20% (19) B, 34% (32) C, CR
MATH 125	Precalc with Algebra	104	29%	15%	▲	URM	63	35% (22) DFWU, 16% (10) A, 21% (13) B, 29% (18) C, CR
						Non-URM	41	20% (8) DFWU, 12% (5) A, 20% (8) B, 49% (20) C, CR
MATH 110E	Finite Math with Support	104	28%	5%	▲	URM	60	30% (18) DFWU, 23% (14) A, 18% (11) B, 29% (17) C, CR
						Non-URM	44	25% (11) DFWU, 14% (6) A, 23% (10) B, 39% (17) C, CR

Mathematics Enrollment - Last 5 Years



For more information, check out Pioneer Insights.

• Graduation rates are calculated on incoming Fall cohorts.*

- [Program Enrollment](#)
- [Degree Data](#)
- [Course Outcomes \(DFW Rates\)](#)
- [Equity Course Outcomes](#)

Pioneer Insights: data.csueastbay.edu

Appendix C: Equity Action Plan

Department of Mathematics Equity Action Plan 2022-2023

Our efforts are motivated by data on DFW rates and opportunity gaps, as well as conversations with students, our own observations, and professional experiences. We access data on DFW rates and equity gaps via [institutional data dashboards](#). DFW refers to grades that are D, F, or withdrawals.

The plan below is organized into two threads:

- **Lower Division** (courses that serve students from across the university): [Current Work](#) and [Future Plans](#).
- **Upper Division** (work that serves primarily math majors and minors): [Current work](#) and [Future Plans](#)

Lower Division

Introduction

Below we outline the current and future work within the Mathematics Department which aims to prioritize Assess, Equity, Flexibility, and Community within the lower division courses. The work described below continues and builds upon the 2021-2022 equity action plan.

Current Work

- **Mathematical Community of Practice (MCoP) and Expansion:** The MCoP is a monthly meeting of instructors in loosely coordinated courses that share active learning strategies and discuss supporting students through Calculus 1. The STEM Pathway Mathematics Community of Practice includes instructors from College Algebra, Precalculus, and Calculus.
- **East Bay STEM Initiative (EBSi):** This is a US Department of Education HSI Title V grant that supports student success in STEM majors through four pillars. The First Year Experience Pillar of this grant is providing additional peer support and community building, documentation for course coordination efforts, and increased collaboration and coordination across first year STEM courses supported by the STEM Lab.
- **EMAP (Equitable Math Assessment Project)** is a grant funded by the California Learning Lab. The project scales a previous project (BAM-C) focused on Precalculus instruction. EMAP has a specific focus on assessment and expands the scope to include Calculus and Algebra. The grant funds continued work on Math 120 Precalculus and Math 125 Precalculus with Algebra.
- **Achieving Critical Transformations in Undergraduate Programs in Mathematics (ACT UP Math)** is a multi-institution grant funded by the NSF. The project funds collaborative engagement with departmental and institutional data focused on equity.
- **Ongoing Math 115E College Algebra work:** We are continuing to support instructors

in implementing the Math 115E course designed in the summer of 2021. This includes weekly emails and meetings for the Math 115E instructional team.

Future Plans

- **Potential updates to Math 118 (Mathematics for the Arts and Humanities):** Development of course materials and alignment/collaboration with the INSPIRE program in the College of Letters, Arts and Social Sciences (CLASS).
- **Data Reports:** At the start of each semester, we want to be able to send out a message with data on the equity gaps and DFW rates for all of our multi-section, lower division classes. This is a precursor to distributing more instructor specific data along with reflection questions for instructors.
- **Assessment Community of Practice:** We plan to develop a Community of Practice to support engagement around active assessment strategies in lower and upper division math courses. This project has been funded to start in January 2023, with CoPs running in AY 2023-2024, 2024-2025.
- **Instructor reflections:** Instructors will be encouraged to look at their DFW and opportunity gaps. We want to develop post-semester reflection questions to provide to instructors that can potentially prompt change in practices.

Upper Division

Introduction

Our previous equity action plan focused on lower division courses. For this year's plan we wanted to expand to include our upper division courses and activities for math majors, while incorporating student voice and perspective. Our aims are to create a greater sense of community among math majors and to identify ways in which we can improve their experience. In Spring 2022, we interviewed groups of students and some of the work below is motivated by those conversations.

Current Work

- **Mathematics Colloquium:** Our mathematics colloquium includes presentations by students engaging in mathematics research, talks by outside speakers, and community building activities.
- **Math Major Feedback Conversations:** In Spring 2022 the Department conversations which led to a number of action items for the Equity Committee.
 - Begin to establish a social media presence (Instagram). This was recommended by math majors as a way to increase engagement and to advertise events put on by the math department.
 - Social events/gatherings: the department now hosts 1 “math major picnic” each semester as a way to create community among math majors, faculty, and staff.
- **NSF S-STEM Planning Grant:** The Math department has an NSF planning grant to develop a proposal for a Track-3 S-STEM grant. This work is in collaboration with Fresno State University and Stanislaus State University. The grant will propose a

program for math majors which offers stipends for 4 years, academic mentoring (including potential research projects), community building, etc.

Future Plans

- **Connecting with alumni:** We want to establish better communication between our current students and alumni. Students would like to know what alumni are doing post-graduation.
- **Establishing connections with local Community Colleges (CCs):** Many of our majors are transfer students. We want to establish better relationships with community colleges to get to know potential students before they come to CSU East Bay.
 - To do this, we plan to advertise our colloquia/PD workshops at CCs.
 - Create a list of CC math professors who we can share opportunities with.
 - Pilot a Math Ambassadors program: have East Bay math majors and alumni, visit CCs and lead discussions on their experiences as math majors. This may include students sharing the math research they work on.
 - Explore possibilities for our faculty to connect with students at CC.