Senate-Administration Workgroup on Admissions

Final Report

November 6, 2025[1]

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Executive summary

Over the past five years, UC San Diego has experienced a steep decline in the academic preparation of its entering first-year students -- particularly in mathematics, but also in writing and language skills. Between 2020 and 2025, the number of students whose math skills fall below high school level increased nearly thirtyfold; moreover, 70% of those students fall below middle school levels, reaching roughly one in twelve members of the entering cohort.[2] This deterioration coincided with the COVID-19 pandemic and its effects on education, the elimination of standardized testing, grade inflation, and the expansion of admissions from under-resourced high schools. The combination of these factors has produced an incoming class increasingly unprepared for the quantitative and analytical rigor expected at UC San Diego.

The Senate–Administration Working Group on Admissions (SAWG) concludes that this trend poses serious challenges both to student success and to the university's instructional mission. Admitting large numbers of underprepared students risks harming those students and straining limited instructional resources. The report offers a series of recommendations to improve the alignment between admissions practices, student readiness, and available support systems.

Key Recommendations

1. Addressing the Math Preparation Crisis

- **Develop and implement a Math Index** to predict students' likelihood of placement into remedial math, using historical placement data and transcript-based variables (coursework, grades, high school attended).
- **Use the Math Index in matching students with majors** to ensure that the number of students requiring Math 2/3B remains within manageable limits, with an initial target of *no more than 300 first-year students* in these courses by 2026–27.
- **Reassess math requirements by major,** ensuring that degree pathways align with actual quantitative demands and that applicants are clearly informed of differences between B.A. and B.S. programs.
- **Require early summer math placement testing** (by June 1) for all incoming students needing math for their major, to enable timely remediation before fall enrollment.

[2] A previous version of this report stated that one in eight students are not meeting middle school standards; this has been corrected to one in twelve. Students not meeting high school standards has grown to roughly one in eight.

- **Bring admissions levels from under-resourced (LCFF+) into alignment** with those of similarly selective UC campuses while maintaining equity and access goals.
- **Establish feedback mechanisms with high schools** -- especially those with persistent mismatches between student grades and placement results -- to address curriculum quality and grade inflation.

2. Improving Writing and Literacy Assessment

- Commission a **dedicated campus study** on writing and literacy preparedness, engaging humanities and writing program faculty, library experts, and specialists in communication across disciplines.
- Develop or adopt **a more predictive assessment of writing and language skills** to be used in admissions, moving beyond GPA and course titles to evaluate readiness for college-level work.

3. Strengthening the Holistic Review and Selection Process

- **Integrate the Math Index** and improved literacy indicators into holistic review for majors requiring high analytical or quantitative skills.
- **Enhance cross-unit communication** between academic departments, Enrollment Management, and the Committee on Admissions (CoA), ensuring faculty input earlier in the admissions cycle and feedback after each cycle.

4. Clarifying the Role of Portfolios in Arts Admissions

- Improve transparency by **ensuring feedback loops** between Admissions, the Dean's Office, and departments, so that faculty reviewers receive information about outcomes for applicants they evaluated.

5. Reaffirming Faculty Oversight through the Committee on Admissions

The Committee on Admissions should assume a **proactive leadership role** in shaping and evaluating admissions policies. Specifically, CoA should:

- Oversee the **implementation and annual recalibration of the Math Index**.
- Collaborate with Enrollment Management to **evaluate correlations between Holistic Review scores, placement results, and student outcomes**.

6. Systemwide Recommendations

- UC San Diego's representative on **BOARS** should advocate for a **systemwide reexamination of standardized testing**, as many peer institutions have already done.

- BOARS should also **investigate disparities in high school grading standards** and develop a UC-wide response to ensure fair and reliable admissions evaluation.

The Charge of the Committee

The Senate-Administration Working Group on Admissions (SAWG) was charged with the following tasks:

1. Conduct a statistical analysis of the **Holistic Review** process.
2. Examine the **mathematics preparation** of admitted and enrolled students.
3. Assess the **writing preparation** of admitted and enrolled students.
4. Analyze the **distribution of majors** among admitted and enrolled students.[3]

The final document outlining the group's charge and membership was issued on **March 3, 2025**, and the SAWG held its first meeting on **March 25, 2025**. At that time, admissions decisions for the 2025 incoming cohort had already been made and were in the process of being posted. It was therefore understood that the group's recommendations would apply to the **2025–26 admissions cycle and beyond**.

During the course of its work, the SAWG identified the **insufficient mathematics preparation of admitted students** as the most urgent concern. Consequently, most of the group's time and effort were devoted to addressing this issue. This is also reflected in this report.

[3] The Working Group made less progress on this task than the others given the urgency of some of the other issues. However, the section on Shaping of the Class does explain how decisions are made about majors.

Background

In recent years, UC San Diego -- like many other UC campuses -- has seen a significant decline in the academic preparation of its entering first-year students. This trend is evident both in the performance of incoming students on math placement tests and in faculty reports that students' language skills increasingly limit their ability to engage with longer and more complex texts.

At our campus, the picture is truly troubling. Between 2020 and 2025, the number of freshmen whose math placement exam results indicate them not meeting high school standards grew nearly **thirtyfold**, despite all of these students having taken beyond the minimum UCOP-required math curriculum, and with high grades. In the 2025 incoming class, this group constitutes roughly **one-eighth** of our entire entering cohort. Moreover, more than 70% of these students are also not meeting *middle school* standards, representing one in twelve entering students. [4]A similarly large share of students must take additional writing courses to reach the level expected of high school graduates, though this is a figure that has not varied much over the same time span.

Moreover, weaknesses in math and language tend to be more related in recent years. In 2024, **two out of five** students with severe deficiencies in math also required remedial writing instruction. Conversely, **one in four** students with inadequate writing skills also needed additional math preparation. [5]

UC San Diego is proud to be a leading public university that serves not only the privileged few but the full spectrum of California's population. If we take seriously our mission as an engine of social mobility, we must be prepared to support students who have been underserved by their prior schooling. But our capacity is not limitless. We can only help so many students, and only when the gaps they need to overcome are within reach.

Admitting large numbers of students who are profoundly underprepared risks harming the very students we hope to support, by setting them up for failure. It also puts significant strain on faculty who work to maintain rigorous instructional standards. Especially now, when our resources become more constrained, we cannot take on more remedial education than we can responsibly and effectively deliver.

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[4] A previous version of this report stated that one in eight students are not meeting middle school standards; this has been corrected to one in twelve. Students not meeting high school standards has grown to roughly one in eight

[5] In 2024, there were 352 who were both in Math 2/3B and AWP 3/4A, representing 4.8% of the incoming class. This was 41% of the math and 24% of the writing class. The year before, there were 242 such students representing 3.5% of the incoming class, and the comparable numbers were 51% and 17%.

In this report, we try to identify several factors that may be contributing to this trend; however, regardless of the underlying causes, the problem is serious and demands an immediate institutional response.

We recommend that the effectiveness of the measures proposed here be evaluated annually, allowing for adjustments and refinements as needed. In addition, the entire issue should be revisited comprehensively in four years to assess progress in light of longer-term student outcomes, and determine what further action is warranted.

In what follows, we present the background to the writing and mathematics preparation challenges, outlining the most likely reasons for their emergence – although our primary focus will be on mathematics. We distinguish between general factors affecting all UC campuses and factors specific to UC San Diego. We also review how Holistic Review is currently practiced on our campus and summarize the measures introduced last year to address the math preparation problem. The report concludes with our recommendations for future action.

The Language and Literacy Preparation Problem

Application Requirements

Applicants from US schools who apply to UC must complete the Area B requirement. This prescribes four years of classes in English in high school with a "C" grade or better, or via a prescribed number of semester/quarter-system acceptable courses. Alternatively, these students can demonstrate language skills by achieving a proper score on an Advanced Placement or International Baccalaureate exam, or by taking the language section of the SAT/ACT. International students from countries where the official language is not English must prove English proficiency by taking one of a list of language tests and perform above a specified level.

Once students are admitted to UC, they must also fulfill the UC Entry Level Writing (ELWR) requirement. Students who have not yet met this requirement prior to enrollment must take a placement test before their first quarter. The test will either certify that the student has met ELWR or place them into an appropriate writing course designed to fulfill the requirement.

Writing Placement Test at UC San Diego

Writing placement in the UC system has changed significantly since 2019, due to changes brought on by the pandemic and by structural changes made by the UC Committee on Preparatory Education.

Until 2023, in accordance with Senate Regulation 636.B, UC students could fulfill the ELWR in a number of ways prior to enrollment at UC: through ACT, SAT, AP or IB scores; by earning a grade of "C" or better in a UC-transferable English composition course; or by sitting for the system-wide Analytical Writing Placement Exam (AWPE). The AWPE was discontinued in 2023, and the new digital SAT is not accepted as a way to fulfill ELWR.

Between 2020 and 2023, all UC campuses were required to develop and implement local placement mechanisms for students who had not fulfilled ELWR via a test score or course. During this time, with approval from the UC San Diego Faculty Senate, the Analytical Writing Program (AWP) developed and implemented a local Writing Placement Process (WPP) for students who had not fulfilled ELWR prior to matriculation.

While the AWPE placed students entirely on the basis of one writing sample that focused on one reading passage, UCSD's WPP process is a ***collaborative placement model*** designed to include students' self-assessment. When students complete the WPP, they reflect on and report information about their high school writing educations and experiences via a survey; learn about the expectations of the different UC San Diego writing courses into which they might be placed; read excerpts of essays taught in these writing courses and produce written responses to these readings; and explain which writing course they think might be best for them and why. Faculty readers from AWP and the eight UC San Diego college writing programs assess students' writing and recommend placement into College Writing, AWP 3, or AWP 4A-4B. If the faculty placement agrees with the student's self-assessment, then the placement process is complete. If the faculty placement disagrees with the student's, one or two senior faculty readers will be brought in until any two assessments agree. While students do not have the final say, they do have some input into the process. This placement mechanism is significantly different from the AWPE; it also is not proctored for most students who take it.

The UC San Diego WPP model complies with the recommendations by the UCOP ELWR Task Force report completed in 2022 that "(1) individual campuses need agency and autonomy to design placement processes in ways consistent with their campus needs, particularly their ELWR curriculum; and (2) … a model allowing input into the placement process from both writing programs and students themselves provides the best opportunity for placement to be successful and satisfying for all parties involved."

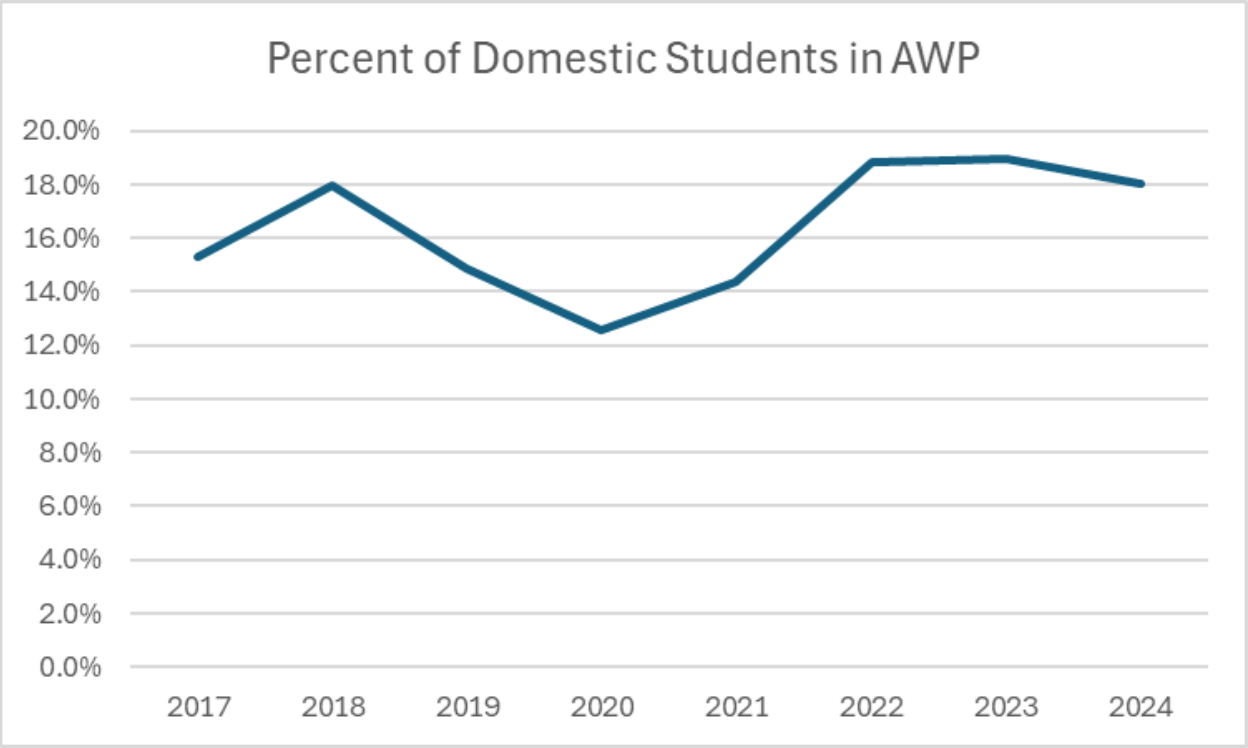
The Historical Trend of Students in the Analytic Writing Program

While the percentage of incoming students that are placed into ELWR-fulfilling courses has stayed relatively similar through the years, the percentage of domestic first-year students who were placed in ELWR-fulfilling courses has increased slightly (**Figure 1**). After a decrease from 2019 to 2021, from 2022 to 2024 the percentage of students placed in AWP rose back to 2018 levels of about 19% (see **Appendix 1**). These increases, along with anecdotal information from

campus colleagues, suggest that UC San Diego students may be impacted by recent national literacy trends. Recent studies suggest that literacy and writing preparation are in decline nationally.

While there are multiple reasons to be concerned about writing preparation, more data would have been needed to extend the workgroup's discussion into writing and literacy preparation. Changes in the placement mechanism and how we evaluate student's writing on the placement exam, changes to education brought on by the pandemic, and the rapid introduction of artificial intelligence tools all have and will continue to contribute to changes in students' reading, writing, and critical thinking skills. **All of this contributed to the workgroup's conclusion that the complexities of student language preparation require a separate inquiry.**

Figure 1. Percent of Domestic Students Who Do Not Meet the Entry Level Writing Requirement and are placed in Analytical Writing Courses Upon Entry



The Math Preparation Problem

Application Requirements

To apply to any University of California campus, California students must meet the **Area C requirement**, which mandates completion of three years of high school mathematics--**Algebra I, Geometry, and Algebra II**, or alternatively the integrated sequence of **Integrated Math I, II, and III**. Students are also **strongly encouraged** to take a fourth year of advanced mathematics, a recommendation that most of our applicants follow. Since the SAT (and ACT) is regularly mentioned when discussing admissions, it is worth noting here that the ACT and SAT math sections test mastery of topics only from these three high school courses which form the Area C requirement. Neither exam tests for any additional material that a student would encounter in more advanced mathematics courses.

The Math Placement Test at UC San Diego

All UC campuses use a testing and placement system to onboard incoming first-year students into the appropriate initial mathematics course for their background, so they can meet the requirements of their chosen major. Most campuses use the Math Placement Exam (MPE) or a variant, based on the state-wide Mathematics Diagnostic, Testing, and Placement Infrastructure (MDTP). This infrastructure has been in place and under continual development since the 1970's, and serves the entire UC, CSU, and CCC systems, as well as California high schools.

The mathematics course placement system at UC San Diego is overseen by the Mathematics Testing and Placement Group (MTP) within the Mathematics Department. MTP onboards all incoming first-year students who need mathematics for their major. Using all data provided by each student, MTP places every student as far as possible into the mathematics course sequences, without placing them into a course that they are not prepared to succeed in. Any information that the (already admitted) student can provide is used: college-level course completion, SAT/ACT scores, AP scores, or IB scores. Even if a student receives an initial placement using their provided information, they still have the option of taking the MPE to place into a more advanced math course than their provided information would support. Students must take the MPE to be placed into a math course when other forms of placement are unavailable.

The Growth of Students in Remedial Math Courses at UC San Diego

Beginning in Fall 2022, the number of students placed into Math 2 began to grow rapidly (see **Table 1**). Math 2 was first created in 2016, and it was originally designed to be a remedial math course serving a very small number of first-year students (less than 100 students a year or around 1% of the incoming class) who were not prepared to start in our standard precalculus courses

(Math 3C and Math 4C) or to start directly in either of our two calculus sequences (Math 10 and Math 20). Math 2 was launched to fill gaps in high-school math knowledge (Algebra I-II and Geometry), typically taken in grades 9-11, and also required for admission to any campus in the UC system (Area C requirement). When covering grade 9-11 knowledge, Math 2 was successful in taking students from that level up to Math 3C within 10 weeks.

Table 1. Growth in the Number of Students with Insufficient Math Preparation

Math Placement Snapshots at 3rd Week Fall Enrollment FA20-FA25

Placement Entering Fall	FA20		FA21		FA22		FA23		FA24		FA25	
	Number	*%*	*Number*	*%*	*Number*	*%*	*Number*	*%*	*Number*	*%*	*Number*	*%*
Math 2	32	0.5%	191	2.5%	390	6.0%	490	7.0%	528	7.2%	665	8.5%
Math 3B	-	NA	-	NA	-	NA	-	NA	388	5.3%	256	3.3%
Math 3C	532	8.2%	979	13.0%	1136	17.3%	953	13.6%	257	3.5%	111	1.4%
Math 4C	333	5.2%	347	4.6%	326	5.0%	448	6.4%	403	5.5%	251	3.2%
Math 10A or 4C	71	1.1%	82	1.1%	101	1.5%	141	2.0%	149	2.0%	173	2.2%
Math 10A (not 4C)	410	6.4%	563	7.5%	517	7.9%	586	8.4%	555	7.6%	516	6.6%
Math 20A	722	11.2%	760	10.1%	523	8.0%	606	8.7%	536	7.3%	691	8.9%
Math 20A or 10B	391	6.1%	423	5.6%	338	5.2%	373	5.3%	397	5.4%	359	4.6%
> Math 20A	3114	48.3%	3030	40.3%	2062	31.5%	2264	32.4%	2981	40.7%	3745	48.0%
No Placement (needs Math)	22	0.3%	159	2.1%	238	3.6%	214	3.1%	244	3.3%	173	2.2%
Does not need Math	822	12.7%	982	13.1%	920	14.0%	917	13.1%	881	12.0%	859	11.0%
Year Total	**6449**	**100.0%**	**7516**	**99.9%**	**6551**	**100.0%**	**6992**	**100.0%**	**7319**	**100.0%**	**7799**	**100.0%**

In Fall 2022, the number of students placed into Math 2 grew to nearly 400, and by Fall 2023, placements into Math 2 increased to nearly 500 students. The Mathematics Department was caught by surprise and scrambled to find additional instructors quickly for Fall 2023. Ultimately, the Mathematics Department could only serve 480 students from the larger pool that needed to take a course remediating math knowledge in order to enter our earliest college-level math courses (Math 3C or 4C). Alarmingly, the instructors running the 2023-2024 Math 2 courses observed a marked change in the skill gaps compared to prior years. While Math 2 was designed in 2016 to remediate missing high school math knowledge, now most students had knowledge gaps that went back much further, to middle and even elementary school. To address the large number of underprepared students, the Mathematics Department redesigned Math 2 for Fall 2024 to focus entirely on elementary and middle school Common Core math subjects (grades 1-8), and introduced a new course, Math 3B, so as to cover missing high-school common core math subjects (Algebra I, Geometry, Algebra II or Math I, II, III; grades 9-11).

No other UC campus offers a course equivalent to Math 2, which remediates elementary and middle school math. In response to growth in remedial math needs at other campuses (see appendix, page 42, of this recent UCOP Report), two other UC campuses (UC Riverside and UC Davis) now offer partial remediation for high school mathematics (portions of our Math 3B syllabus). While not mentioned in the UCOP report, a third campus (UC Irvine) also now offers a self-study partial high school remediation course. However, UC San Diego is unique in giving

college credit for our high school math remediation course (Math 3B); the similar courses now offered at UC Riverside, UC Davis, and UC Irvine carry only workload credit.

In Fall 2024, the numbers of students placing into Math 2 and 3B surged further, with over 900 students in the combined Math 2 and 3B population, representing an alarming 12.5% of the incoming first-year class (compared to under 1% of the first-year students testing into these courses prior to 2021). In Fall 2025, the numbers of students placed into Math 2 and 3B increased yet again, although as a percentage of the larger incoming first-year class the fraction went slightly down (11.8%) due to some changes made by Enrollment Management for the Fall 2025 incoming class, after being alerted to the math preparation problem in Winter 2024.

The first direct indication that other UC campuses were facing similar problems was in Spring 2024, when the Math Chair at UC Berkeley reached out to the UC San Diego Math Chair for advice on enforced testing and placement for entry into math courses, which Berkeley had never done previously. UC San Diego has been centrally involved in the ongoing development of the state-wide MDTP infrastructure since the 1970's, with the MDTP director and web resources based at UC San Diego, and now UC San Diego is viewed as having the most experience with testing and placement among the UC campuses. This led first to a Zoom meeting between the chairs and undergraduate deans at both campuses, where the UC San Diego contingent described our testing and placement system. The UC San Diego participants outlined current use of SAT, AP, IB, and other applicant information for placement, along with use of UC San Diego's MDTP-based MPE. They have also since created a semester-long precalculus course (equivalent to UC San Diego's Math 3C/4C); they had previously been unique among the UC campuses in not offering any course below calculus until last year.

The interactions with UC Berkeley led to an email exchange among all UC Math Chairs discussing the math preparation challenges at each campus, which then produced a survey of the UC Math Chairs and Vice Chairs (carried out by the UC San Diego Undergraduate Vice Chair in Math). The survey consisted of two questions: "*(1) With Fall 2019 as a baseline, what is the increase over the last five years in the number of first-year students that are unable to start in college-level precalculus (courses equivalent to UC San Diego's Math 3C/4C)?*", and *(2) "What math testing and placement mechanism does your department and campus currently use?"*. To the first survey question, all campuses other than UC San Diego reported that their observed increase was a factor of two (about half the campuses), or a factor of three (about half of the campuses), with UC San Diego reporting an observed increase that was significantly higher. To the second survey question, five of the campuses (including UC San Diego) use the state-wide MDTP infrastructure for creating a local MPE, and four of the campuses use either a commercial product developed alongside the ALEKS commercial system, or a completely internal test unique to their campus.

The UC San Diego Math Department believes that the math preparation problem at UC San Diego is significantly worse than at other UC campuses, based on local testing and placement, on what has been shared about the experience at other campuses through the survey, and on public data. This view is consistent with the published UCOP data showing that during 2022-2024, UC San Diego led all campuses by a significant margin in total first-year enrollment from LCFF+ high schools[6], together with UC San Diego testing and placement data that consistently shows significantly higher rate of placement of LCFF+ students into Math 2 and Math 3B compared with first-year students from all other schools (this is discussed in more detail later in the report.)

The previous workgroup report on math preparation discusses downstream effects of students placing into Math 2. Based on data from 2017 through 2023, students with this placement have a relatively high D, F or Withdraw ("DFW") rate in the Math 10 series (10A: 24.1%, 10B: 30.3%, and 10C: 40.7%). These percentages are higher than the DFW rates of those who place into 3C (10A: 15.2%, 10B: 19.5%, 10C: 25.1%) and of those who place into 10A (where DFW rates are close to the STEM average of around 10%). The 10B DFW rate is worrisome, since this is the final calculus course required for the Psychology BS and most Biology majors. The numbers are even more problematic in the 20 series, with nearly a third (31.2%) of students with Math 2 placement having DFWs in 20B and over half (51.8%) in Math 20C. Indeed, there are data that show that few, if any students who place into Math 2 have successfully completed an engineering degree.[7]

In the following sections, we present first the general factors that contributed to the problem and then those specific to UC San Diego.

General Factors

The Covid-19 Pandemic

Over the past five years, a series of events have profoundly affected education in California. Beginning in the spring of 2020, the COVID-19 pandemic forced both K-12 and higher education institutions to conduct classes online, leading to a well-documented decline in student preparedness. Using the state's Department of Education assessment (CAASPP) as the measure, both language and math achievement levels dropped in 2022 and have yet to fully recover

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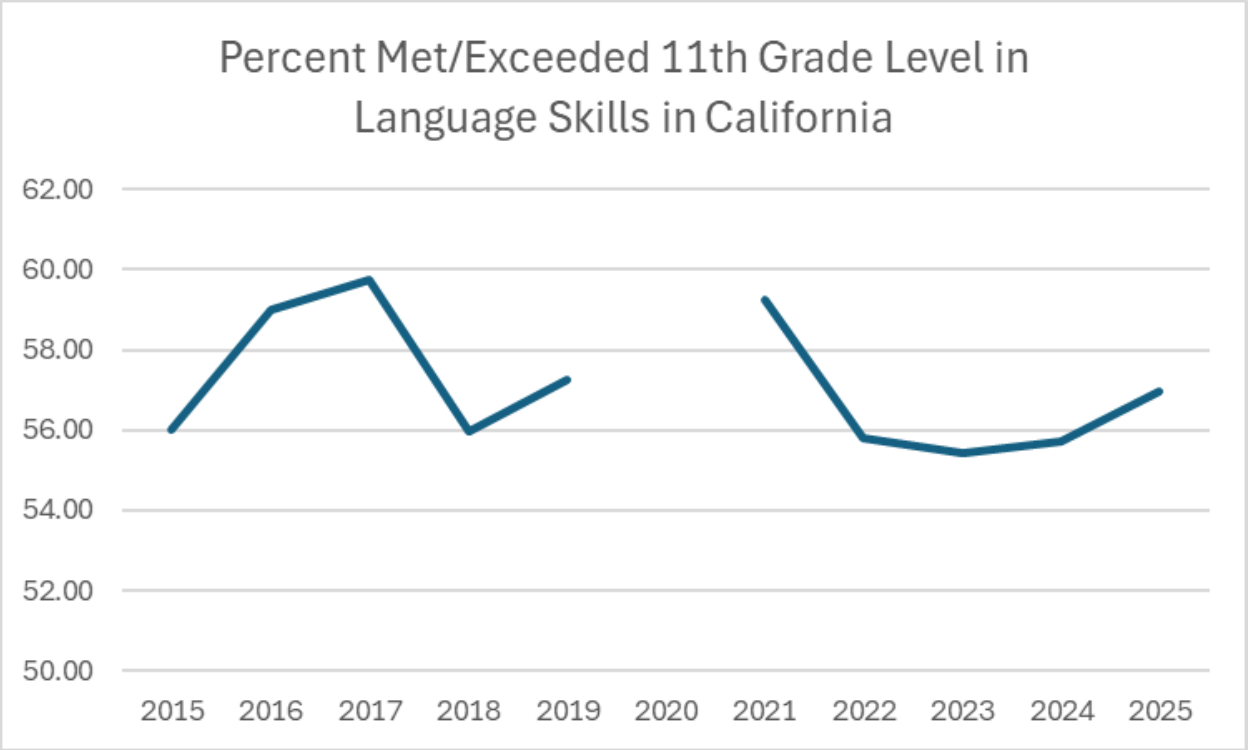
[6] In 2013, the California state legislature introduced a supplemental funding framework for California K-12 public schools, the so-called Local Control Funding Formula (LCFF). The subset of California public schools in which more than 75 percent of the school's total enrollment is composed of students who are identified as either eligible for free or reduced-price meals, or English learners, or foster youth, are eligible for additional funding through the LCFF program.

[7] We note that the number of students who place into Math 2 and subsequently take Math 20 courses is small compared to those who take Math 10 courses (203 versus 1207, over the seven-year period). In the 2020 cohort, only one of those students was admitted to an Engineering major.

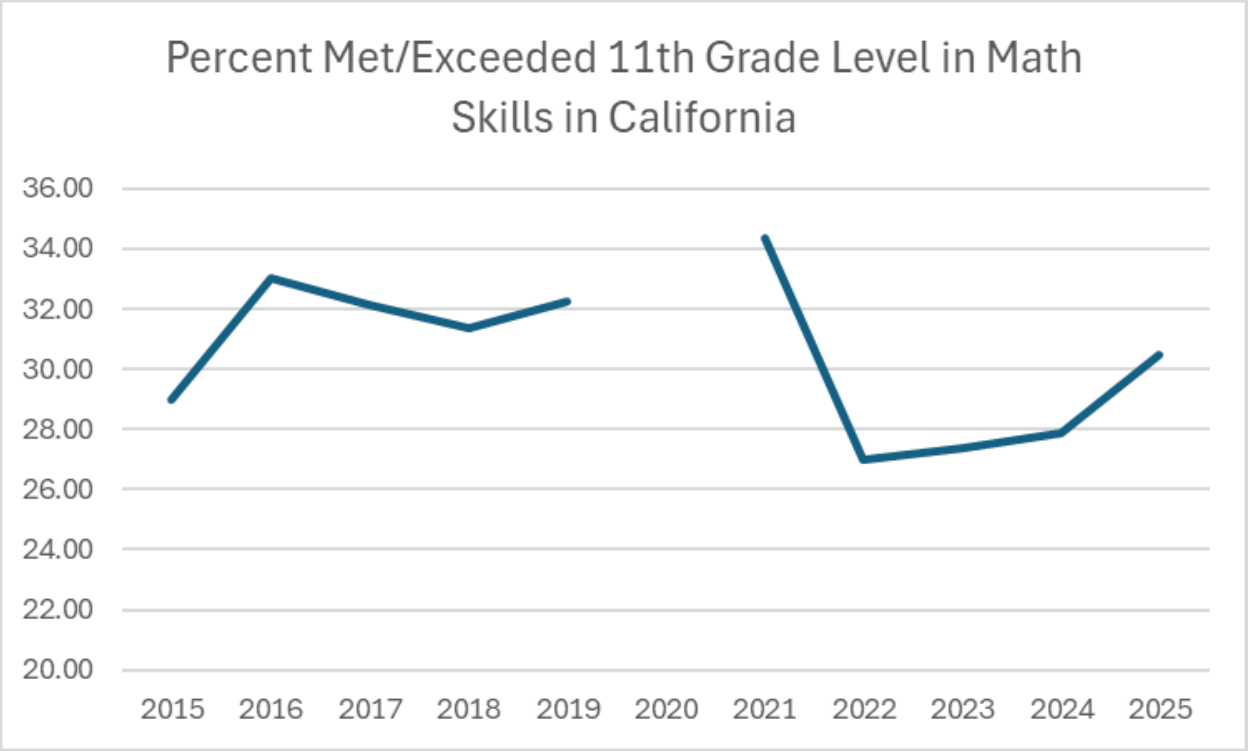
(**Figure 2, 3**). Whether this decrease in achievement was about teachers being less effective at delivering instruction online, or about students being less effective at learning and retaining it – or both! – regardless, the decline is tangible and will take several years to correct.

Figure 2. Eleventh Grade Level Language Skills in California High Schools 2015-2025



Source: California Department of Education web site. No data is available for 2020. Data from 2021, unlike other years, are not comparable because the test was voluntary, and only a small share of schools participated.

Figure 3. Eleventh Grade Level Math Skills in California High Schools 2015-2025



Source: California Department of Education web site. No data is available for 2020. See note to **Figure 2** about the lack of comparability of the 2021 data.

The decline has had lasting consequences. Students who experienced this at any time – whether in their early years or closer to their senior year – often never fully recover by the time they graduate; and the deficit in teaching/learning will be felt for at least a few more years. For example, this year's high school seniors (graduating 2026) began remote learning in spring of their 6th grade year, often one of the most critical in student development for math skills.

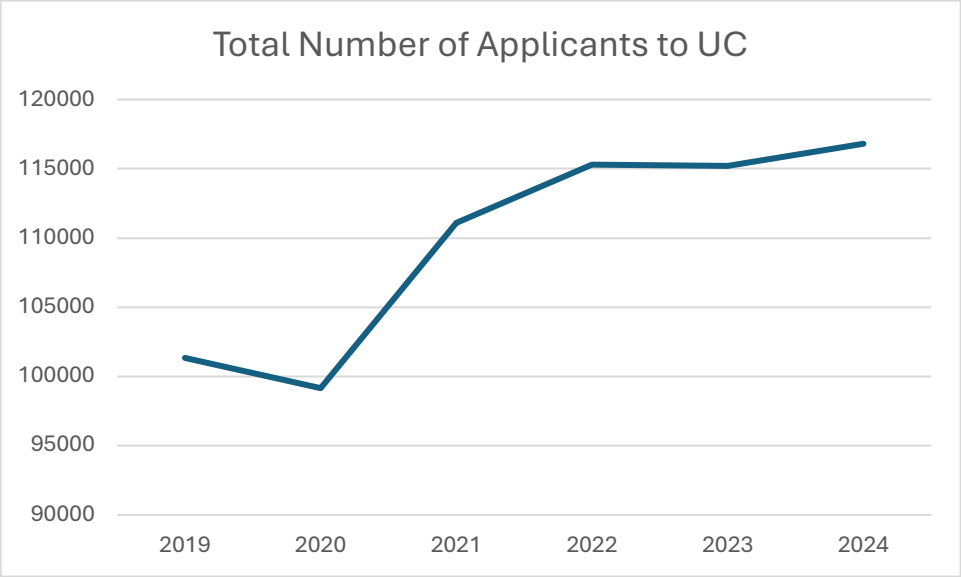
Covid also exacerbated existing inequalities across schools in ways that have continued after the pandemic waned and instruction returned to in-person (Bishop and Howard 2024, Pier et al 2021, Gee et al 2023). Even today, chronic absenteeism – the percent of students missing more than 10 percent of classes – is high. The last data from 2024 shows chronic absenteeism at 20.4%, down from 30% during the pandemic but still much higher than it was before COVID when it hovered around 14% (California Department of Education web site, Edsource August 22, 2025). The most negatively affected schools were under-resourced schools in poor areas that already were struggling before the pandemic.

The Elimination of Standardized Testing

In 2020, the **University of California Board of Regents**, against the advice of the report by the Academic Senate's Standardized Testing Task Force (STTF), voted to eliminate the SAT and ACT from admissions consideration. Beginning with the cohort entering in 2021, standardized test scores were no longer used in the admissions process.

The decision aimed to broaden the applicant pool, based on concerns that otherwise qualified students were deterred from applying by standardized testing requirements. The number of applicants from California to the UC system did grow from 99,156 in 2020 to 116,805 in 2024, an increase of 18 percent (see **Figure 4**).

Figure 4. Increase in the Number of Applicants to UC After Dropping SAT/ACT



Source: UCOP, see also **Table 4a, b**

The elimination of standardized testing resulted in more reliance on high school grades even though the STTF report notes the worrisome trend of grade inflation in many schools that had already been substantial in 2020.[8] During COVID, grade inflation and lowered standards in California high schools likely accelerated. The disruption created by COVID made it very difficult to objectively evaluate students. Many classes moved from letter grade to pass/fail for

[8] This is hard to quantify since the holistic admissions process in use across all the UC campuses is highly qualitative, so grades did not have a set/fixed weight in determining admission while scores were required, nor after they were eliminated.

that period, and teachers often felt compelled to lower grading standards in acknowledgement of students' special challenges.[9]

As a result, the quality of the information UC received from school transcripts became less reliable as a gauge of how well a student will succeed if admitted.

At UC San Diego, in Fall of 2024, of those who demonstrated math skills not meeting middle school levels, only 6% met only the minimum high school course requirement, reporting Algebra II and Integrated III as their most advanced math course (**Table 2**). The other 94% went beyond, with 42% percent completing Calculus or Precalculus, and another 44% whose last recorded high school math course was a Statistics class. The pattern of high school math classes taken in many cases suggests much higher levels of math skill than the actual math skill the student often has.

Table 2. Highest High School Math Class Completed, with Math Placement for Fall 2024

Last Math taken in HS*	Math 2	Pct of 2	Math 3B	Pct of 3B	3C or 4C	Pct 3C/4C	Math 10/20	Pct 10/20	Math not needed	Pct not needed	Math needed (no test)	Pct needing test
(course not coded)*	60	13%	42	11%	49	7%	341	7%	87	10%	26	11%
Below A-G minimum*	0	0%	0	0%	0	0%	6	0%	0	0%	3	1%
Algebra II or Integrated III	29	6%	11	3%	5	1%	20	0%	31	4%	11	5%
Further Alg, DataSci, FinMath**	33	7%	17	4%	37	6%	356	8%	68	8%	15	6%
Statistics	208	44%	156	40%	187	28%	1159	25%	305	35%	67	27%
Precalculus	103	22%	72	19%	95	14%	161	3%	97	11%	53	22%
Calculus***	95	20%	90	23%	284	43%	2574	56%	294	33%	69	28%
TOTAL	**528**		**388**		**657**		**4617**		**882**		**244**	

* this is not perfectly captured data, and future studies should improve on coding

** includes "IB Math" and other foreign courses

*** includes A-level Math through Cambridge exams

Grades achieved in high school math classes are not helping UC to evaluate math skills much more either (**Table 3**). While there are some differences between those who need preparatory courses and those who do not (and are placed into Math 10/20A) the difference in high school math grade averages is very small, often less than one-tenth of a grade point. The correlation between the average math grade and the placement result is only around 0.25 on a scale of 0 to 1. In 2024, over 25% of the students in Math 2 had a math grade average of 4.0.

[9] On July 1, 2021, Governor Newsom signed into law AB 104 on grading changes and special accommodations in California high schools for the 2021-22 school year. https://legiscan.com/CA/text/AB104/id/2422454

Table 3. Average High School Math GPA By Placement Results

Placement result	2019	2020	2021	2022	2023	2024
Math 2	3.47	3.62			3.67	3.65
Math 3B	--	--			--	3.70
Math 3C	3.60	3.69			3.70	3.71
Math 4C	3.72	3.72	data not included in		3.75	3.74
Math 10	3.67	3.72	this chart		3.75	3.74
Math 20	3.82	3.79			3.85	3.84
No placement (needs math)	3.61	3.68			3.61	3.62
Doesn't need math	3.63	3.67			3.72	3.69

We can also observe a small increase in the average high school math grade over the years for students in Math 2/3B. In fact, in almost all categories, the average rose between 2020 and 2023. At the same time our admit pool is slipping in math preparation, we see a slight improvement in their math grades from high school.

The elimination of standardized testing together with COVID resulted in a **mismatch between students' course level/grades and their actual levels of preparation,** with far-reaching implications for determining math readiness and course placement.

This is not to say that students' math curriculum is useless in judging their preparation, but it means that we will have to weigh information in a more careful and complex manner. We have to read the information about the math preparation of applicants differently. We must optimize the noisy signal by weighing each piece of information with respect to its ability to predict the student's likelihood of failing the math placement test once admitted. We will discuss how to do this under our recommendation for using a Math Index.

Explaining the Excessive Increase at UC San Diego

Admissions and Enrollments from LCFF+ High Schools

In 2013, the California state legislature introduced a supplemental funding framework for California K-12 public schools, the so-called Local Control Funding Formula (LCFF). The subset of California public schools in which more than 75 percent of the school's total enrollment is composed of students who are identified as either eligible for free or reduced-price meals, or English learners, or foster youth, are eligible for additional funding through the LCFF program. The subset of California schools that meet these eligibility requirements are referred to as **LCFF+ schools**, and since 2016, University of California tracks enrollment from LCFF+ High Schools. The 2016-17 state budget for the UC system included "*one-time funding for*

support services for low-income students and students from underrepresented minority groups". The one-time funding was intended to increase the number of applications, admissions, and enrollments from LCFF+ high schools to the UC, a contract signed by then President Michael Drake. Since 2017, each fall UCOP must submit a report on what UC has done to support LCFF+ schools. A second allocation, supporting the same legislative priority, was provided through the 2019–20 Budget Act. The report on "*Admissions and Enrollment of Students from LCFF+ High Schools*" is published annually on the UCOP website, and outlines the activities that the UC system engages in to meet these goals every year since 2016 (UCOP 2020, 2021, 2022, 2023, 2024). An important complementary resource is the UCOP Directory for K-12 Schools, which tracks important high school characteristics such as the LCFF+ classification of all California high schools.

System-wide changes in LCFF+ Admissions and Enrollments (2019-2024). According to the UCOP Annual reports on LCFF+ admissions and enrollment, between 2019 and 2024, the number of LCFF+ students applying to at least one UC campus grew modestly, from 27,370 to 29,577 (**Table 4a**). In contrast, the number of LCFF+ students admitted to at least one campus rose more substantially, from 15,829 to 21,634, driven by an increase in admit rates. While application rates remain about 1.5 times higher among non-LCFF+ schools, admit rates during this period shifted in favor of LCFF+ applicants. In 2019, admit rates stood at 58% for LCFF+ students versus 64% systemwide for students from better-resourced schools. By 2024, those rates had reversed, with 73% for LCFF+ and 71% systemwide (**Table 4b**).[10]

[10] To correctly interpret the numbers regarding LCFF+ admissions and enrollments in the tables appearing in our report that are taken from the UCOP Annual Reports in different years, it is important to note that the *LCFF+ designation changes slightly from year to year,* since it depends on self-reporting of individual schools. For example, data in the tables from the 2022 report (covering 2020–2022) are based on the 2020–2021 LCFF+ classification, while data in the tables taken from the 2024 report (covering 2022–2024) are based on the 2022–2023 LCFF+ classification. As a result, data for the same year appearing in two different UCOP reports will vary slightly (by a few percent).

Table 4a. CA High School Graduates, Applicants, Admits, Enrollees By UC System, 2019-2021

	Students	LCFF+	Non-LCFF+	TOTAL
2019	H.S. Graduates	150,154	288,496	438,650
	Applicants	27,370	73,950	101,320
	Admits	15,829	47,178	63,007
	Enrollees	7,790	25,159	32,949
	Application Rate	18%	26%	23%
	Admit Rate	58%	64%	62%
	Yield Rate	49%	53%	52%
2020	H.S. Graduates	145,794	282,187	427,981
	Applicants	27,140	72,016	99,156
	Admits	18,393	51,993	70,386
	Enrollees	7,608	26,869	34,477
	Application Rate	19%	26%	23%
	Admit Rate	68%	72%	71%
	Yield Rate	41%	52%	49%
2021	H.S. Graduates	152,950	279,806	432,756
	Applicants	23,163	87,949	111,112
	Admits	16,014	57,955	73,969
	Enrollees	6,954	28,900	35,854
	Application Rate	15%	31%	26%
	Admit Rate	69%	66%	67%
	Yield Rate	43%	50%	48%

Table 4b. CA High School Graduates, Applicants, Admits, Enrollees By UC System, 2022-2024

		LCFF+	Non-LCFF+	TOTAL
2022	H.S. Graduates	144,494	287,081	431,575
	Applicants	28,137	87,157	115,294
	Admits	19,350	56,316	75,666
	Enrollees	8,480	27,696	36,176
	Application Rate	19%	30%	27%
	Admit Rate	69%	65%	66%
	Yield Rate	44%	49%	48%
2023	H.S. Graduates	150,762	281,288	432,050
	Applicants	28,724	86,463	115,187
	Admits	20,001	59,396	79,397
	Enrollees	8,934	29,077	38,011
	Application Rate	19%	31%	27%
	Admit Rate	70%	69%	69%
	Yield Rate	45%	49%	48%
2024	H.S. Graduates	n/a	n/a	n/a
	Applicants	29,577	87,228	116,805
	Admits	21,634	61,502	83,136
	Enrollees	8,915	29,774	38,689
	Application Rate	n/a	n/a	n/a
	Admit Rate	73%	71%	71%
	Yield Rate	41%	48%	47%

LCFF+ Admissions and Enrollment by Campus (2019-2024). As documented in the annual reports (UCOP 2020, 2021, 2022, 2023, 2024), and reproduced as **Table 5a** and **Table 5b** below, UC campuses have participated unevenly in these changes to LCFF+ admissions and enrollments. In 2021, UC Riverside and UC Merced admitted the largest numbers of LCFF+ students, while Riverside and Irvine enrolled the most. Beginning in 2022, however, UC San Diego took the lead, with enrollment jumping from 894 in 2021 to roughly 1,800 in each of the following three years (2022-2024). By comparison, most other campuses saw only modest increases. UC Berkeley remained below 1,000, and UCLA below 1,100 LCFF+ enrollments.

Table 5a. CA High School Graduates, Applicants, Admits, Enrollees By UC Campus, 2020-2022

		Berkeley	Davis	Irvine	Los Angeles	Merced	Riverside	San Diego	Santa Barbara	Santa Cruz
2020	Applicants	8,052	9,750	18,015	13,810	9,649	14,541	12,280	11,405	8,995
	Admits	1,988	3,646	2,532	1,598	8,183	6,916	3,486	3,567	3,929
	Enrollees	826	933	739	887	941	1,328	814	620	486
	Admit Rate	25%	37%	14%	12%	85%	48%	28%	31%	44%
	Yield Rate	42%	26%	29%	56%	11%	19%	23%	17%	12%
2021	Applicants	9,864	10,108	17,147	16,524	8,635	13,829	12,762	11,012	8,428
	Admits	2,112	3,989	3,923	1,650	7,535	7,636	4,467	3,870	4,274
	Enrollees	779	886	1,359	911	895	1,308	1,017	571	474
	Admit Rate	21%	39%	23%	10%	87%	55%	35%	35%	51%
	Yield Rate	37%	22%	35%	55%	12%	17%	23%	15%	11%
2022	Applicants	12,003	10,201	18,457	18,464	7,931	13,371	14,013	10,486	8,438
	Admits	2,042	3,455	3,650	1,682	7,219	7,566	6,850	4,092	3,491
	Enrollees	885	694	1,194	1,001	993	1,296	2,038	708	465
	Admit Rate	17%	34%	20%	9%	91%	57%	49%	39%	41%
	Yield Rate	43%	20%	33%	60%	14%	17%	30%	17%	13%

Table 5b. CA High School Graduates, Applicants, Admits, Enrollees By UC Campus, 2022-2024

		Berkeley	Davis	Irvine	Los Angeles	Merced	Riverside	San Diego	Santa Barbara	Santa Cruz
2022	Applicants	12,053	10,174	18,186	18,074	7,359	12,741	14,559	10,379	8,119
	Admits	2,003	3,502	3,710	1,607	6,600	7,559	6,427	4,201	3,419
	Enrollees	835	689	1,147	952	750	1,248	1,790	681	390
	Admit Rate	17%	34%	20%	9%	90%	59%	44%	40%	42%
	Yield Rate	42%	20%	31%	59%	11%	17%	28%	16%	11%
2023	Applicants	12,330	10,024	18,858	18,226	7,147	12,602	15,259	11,148	8,540
	Admits	2,393	4,239	3,726	1,663	6,301	7,667	6,353	4,130	4,232
	Enrollees	971	861	1,116	1,023	759	1,328	1,850	630	396
	Admit Rate	19%	42%	20%	9%	88%	61%	42%	37%	50%
	Yield Rate	41%	20%	30%	62%	12%	17%	29%	15%	9%
2024	Applicants	12,169	10,490	19,169	18,758	7,230	13,082	16,299	11,091	9,669
	Admits	1,901	4,529	4,396	1,813	6,543	8,855	6,843	4,362	5,350
	Enrollees	786	890	1,242	1,091	690	1,326	1,799	610	487
	Admit Rate	16%	43%	23%	10%	90%	68%	42%	39%	55%
	Yield Rate	41%	20%	28%	60%	11%	15%	26%	14%	9%

Three components contributed to the sharp rise in LCFF+ student enrollment at UC San Diego. First, the number of applications from LCFF+ schools grew across the board. This increase stemmed only modestly from a rise in the total number of LCFF+ students and more from the fact that each student applied to a greater number of UC campuses. Between 2021 and 2022, LCFF+ applications to UC San Diego increased by 1,251. Second, admit rates for LCFF+ applicants also rose markedly, from 35% in 2021 to 44% in 2022, and remained above 40% over the following two years. These rates exceeded not only those at UC Berkeley and UCLA, but also UC Irvine and UC Santa Barbara. Finally, UC San Diego's yield rate, the share of admitted LCFF+ students who ultimately enrolled, also increased between 2021 and 2022 from 23% to 30%. As a result, UC San Diego has had the largest enrollment of LCFF+ students of all UC campuses during the years 2022-2024. The campus with the next highest enrollment of LCFF+

students is UC Riverside, which trails UC San Diego by 450-550 LCFF+ enrollments per year during that period. Preliminary data shows that UC San Diego has maintained these high LCFF+ enrollments in 2025, with more than 1,550 LCFF+ enrollments, so that UC San Diego is likely to again have the highest LCFF+ enrollment across the entire UC system for a fourth year in a row.

Taking into account the varying sizes of the undergraduate populations at each campus, and the size of the incoming first-year classes, **Table 6** shows that UC San Diego greatly exceeded the LCFF+ enrollment percentages of all other campuses during 2022-2024, except for UC Riverside (which still trails UC San Diego) and UC Merced (which leads UC San Diego by a few percentage points). The first panel of the table shows the entire first-year classes at each campus during 2022-2024, and the second panel shows the subset of first-year classes from California high schools. The first panel shows that a quarter (or more) of enrolled first-year students at UC San Diego during 2022-2024 were admitted from LCFF+ schools, compared to under 20% for all other UC campuses except UC Riverside and UC Merced. The second panel shows that considering only enrolled students from California high schools, during 2022-2024 UC San Diego led all campuses other than UC Merced in enrollment percentages from LCFF+ high schools, with UC San Diego leading all campuses (including UC Merced) in 2023.[11]

Table 6. Total and LCFF+ Percentages by UC Campus, 2020-2024

All First-Years	2020 Class			2021 Class			2022 Class			2023 Class			2024 Class		
Campus	Total	LCFF+	*Pct LCFF+*	Total	LCFF+	*Pct LCFF+*	Total	LCFF+	*Pct LCFF+*	Total	LCFF+	*Pct LCFF+*	Total	LCFF+	*Pct LCFF+*
Berkeley	6117	826	14%	6931	779	11%	6726	885	13%	6641	971	15%	6272	786	13%
Davis	6144	933	15%	7482	886	12%	6399	694	11%	6577	861	13%	6767	890	13%
Irvine	5765	739	13%	6489	1359	21%	5664	1194	21%	6796	1116	16%	6736	1242	18%
LosAngeles	6386	887	14%	6584	911	14%	6462	1001	15%	6585	1023	16%	6610	1091	17%
Merced	1951	941	48%	2410	895	37%	2393	993	41%	2419	759	31%	2093	690	33%
Riverside	4863	1328	27%	5204	1308	25%	5573	1296	23%	5521	1328	24%	5422	1326	24%
San Diego	*6449*	*814*	*13%*	*7542*	*1017*	*13%*	*6546*	*2018*	*31%*	*7005*	*1850*	*26%*	*7330*	*1799*	*25%*
Santa Barbara	4847	620	13%	4898	571	12%	4966	708	14%	5044	630	12%	5008	610	12%
Santa Cruz	4194	486	12%	4188	474	11%	3859	465	12%	4381	396	9%	4383	487	11%
TOTALS	**46716**	**7574**	**16%**	**51728**	**8200**	**16%**	**48588**	**9254**	**19%**	**50969**	**8934**	**18%**	**50621**	**8921**	**18%**

Residents only	2020 Class			2021 Class			2022 Class			2023 Class			2024 Class		
Campus	Total	LCFF+	*Pct LCFF+*	Total	LCFF+	*Pct LCFF+*	Total	LCFF+	*Pct LCFF+*	Total	LCFF+	*Pct LCFF+*	Total	LCFF+	*Pct LCFF+*
Berkeley	4539	826	18%	4857	779	16%	5216	885	17%	5260	971	18%	5229	786	15%
Davis	4856	933	19%	5655	886	16%	4914	694	14%	5289	861	16%	5326	890	17%
Irvine	4563	739	16%	4706	1359	29%	4656	1194	26%	5240	1116	21%	5072	1242	24%
LosAngeles	4798	887	18%	4557	911	20%	4974	1001	20%	5198	1023	20%	5234	1091	21%
Merced	1928	941	49%	2397	895	37%	2385	993	42%	2404	759	32%	2060	690	33%
Riverside	4680	1328	28%	4992	1308	26%	5192	1296	25%	5191	1328	26%	5163	1326	26%
San Diego	*4788*	*814*	*17%*	*5255*	*1017*	*19%*	*5323*	*2018*	*38%*	*5559*	*1850*	*33%*	*5728*	*1799*	*31%*
Santa Barbara	4016	620	15%	3665	571	16%	3847	708	18%	3993	630	16%	4115	610	15%
Santa Cruz	3930	486	12%	3844	474	12%	3457	465	13%	3974	396	10%	4023	487	12%
TOTALS	**38098**	**7574**	**20%**	**39928**	**8200**	**21%**	**39964**	**9254**	**23%**	**42108**	**8934**	**21%**	**41950**	**8921**	**21%**

[11] This paragraph has been updated from earlier versions of the report to accurately describe the most recent data included in Table 6.

LCFF+ Enrollment Impacts on Placements into Math 2 and 3B. Unfortunately, this surge of enrollment of LCFF+ students occurred at a particularly challenging time. As noted earlier, the pandemic produced greater learning losses in under-resourced schools, and their academic recovery has been slower. As a result, UC San Diego's expansion of LCFF+ intake coincided with a period when the academic preparation gap between LCFF+ and non-LCFF+ students was widening.

As shown in **Table 7**, when UC San Diego doubled its LCFF+ enrollees in 2022-2023, the number of students placed into Math 2 also nearly doubled, from 191 to 390 (at that time, Math 3B was not yet offered). Of that increase, 159 of the 199 additional students (80%) came from LCFF+ schools. In 2023–2024, the combined enrollment in Math 2/3B grew by another 100 students, 63 of whom came from LCFF+ schools. Although the number of LCFF+ admits declined slightly from 2022 in the following two years, their representation among underprepared students continued to grow sharply. While in 2021–2022 only one in eight LCFF+ students required Math 2/3B placement, by 2025–2026 that number had risen to one in three. Absent this deterioration in math preparation among LCFF+ admits, the 2025–2026 Math 2/3B cohort would have been approximately 615 students instead of 921. Between 2021 and 2025, the size of Math 2/3B enrollments grew by 730 (from 191 to 921); the number of LCFF+ students in Math 2/3B grew from 106 out of 191 (56% of Math 2/3B enrollment) in 2021-2022, to 492 of 921 (53% of enrollment) in 2025-2026. LCFF+ students represented larger percentages of Math 2/3B enrollments (61% to 68%) over the previous three years (i.e., 2022-2024).

Our approach to LCFF+ students needs to be adjusted if we want to bring down the number of students who need special help with math success. Yet, it is important to recognize that the growth in students needing remedial mathematics support in the last five years would still be considerable even if UC San Diego had enrolled LCFF+ students as a percentage of the incoming class that was comparable to our peer UC campuses, or even if UC San Diego had admitted no LCFF+ students at all. As described at length in this report, our fundamental challenge is the lack of reliable predictive information about mathematics preparation in all applicant files since the abandonment of the SAT.

Table 7. Students from LCFF+ Schools in Math 2/3B

Year	UCSD Enrollment (freshmen)	Math 2/3B Placements (# of freshmen)	Math 2/3B Placements (% of freshmen) (w/o LCFF+)	UCSD LCFF+ Enrollment (% of freshmen)	Math 2/3B Placements from LCFF+ (% of placements)	Math 2/3B Placements from LCFF+ (% of all LCFF+)
2021-2022	7516	191	2.5% (1.3%)	894 (12%)	106 (56%)	12%
2022-2023	6551	390	6.0% (2.6%)	1790 (27%)	265 (68%)	15%
2023-2024	6992	490	7.0% (3.2%)	1850 (27%)	328 (67%)	18%
2024-2025	7319	916	12.5% (6.5%)	1799 (25%)	557 (61%)	**31%**
2025-2026	7799	921	11.8% (6.9%)	1553 (20%)	492 (53%)	**32%**

Conversations with researchers into K-12 education suggest that LCFF+ schools struggle with both availability of higher-level math courses and qualified instructors. Therefore, it is not surprising that students from these schools place into remedial math at higher percentages. These resource disparities parallel general societal inequities; hence, we find that lower income, first generation, and under-represented students are disproportionately represented both in LCFF+ schools and Math 2/3B placement. Given that, as a public university, we are charged by the Board of Regents to serve all segments of California's college-aged students, we cannot simply admit only from better-resourced schools, this would replicate privilege and fail to support our mission as an institution that promotes social mobility. From a more practical perspective, we would also be unable to meet our enrollment targets. This situation goes to the heart of the present conundrum: in order to holistically admit a diverse and representative class, we need to admit students who may be at a higher risk of not succeeding (e.g., with lower retention rates, higher DFW rates, and longer time-to-degree). The workgroup recognizes that there are not simple solutions but makes recommendations that attempt to find a middle ground.

Increase in the Proportion of In-State Students

Starting with the 2022 admission cycle, UCOP charged San Diego, Berkeley, and Los Angeles with taking steps to decrease the number of spots in the incoming class that went to non-residents vs California residents. To achieve these goals, each of these three most in-demand campuses would need to both increase resident enrollment *and* decrease nonresident enrollments, not simply doing one or the other. UCOP and the legislature also acknowledged that for these campuses to make such a swing would reduce our tuition revenue, since non-residents pay roughly three times the rate of in-state students in tuition each year; up to a certain cap each year, they offered a "buy-down" that would make it possible for the campuses to be made financially whole (in regard to their tuition revenue) in the interest of balancing increased access for our own state with financial stability.

At the San Diego campus, the percentage of the incoming class (first-year and transfer combined) that was non-resident had gone from 21.8% in 2019 all the way up to 27.5% in 2021. Additionally (see **Table 8**, below), the 2021 class was more than 1,100 students larger than 2020, and 2022 was meant to be a year to counterbalance this with a one-year drop to an incoming class that would be slightly less than 2020. As a result, the 2022 class was only 16.6% non-resident. This meant that the number of nonresident first-years would be roughly half in 2022 what it was in 2021, while the number of 2022 CA residents went up modestly. This pattern would continue into the 2023 and 2024 cycles, until Fall 2025 (not shown), other factors caused us to swing back toward more non-residents.

Accomplishing the increase in resident enrollment (for both first-years and transfers) has been a win for the system and the state; and San Diego has outperformed the other two campuses in this arrangement. For multiple years now, we have enrolled more resident undergraduates than any other campus in the system, and as of 2024, enrolled more *total* undergraduates as well.

Table 8. Growth in San Diego New Student Enrollment, 2019-2024

New Undergraduates	Fall 19	Fall 20	Fall 21	Fall 22	Fall 23	Fall 24
First Year	**6,708**	**6,447**	**7,544**	***6,546***	***7,007***	***7,330***
CA Resident	5,168	4,797	5,265	*5,318*	5,564	5,730
Nonresident	1,540	1,650	2,279	*1,228*	1,443	1,600
Resident : Nonresident					*3.9*	*3.6*
Transfer	**3,137**	**3,347**	**3,604**	***3,068***	***3,214***	***3,757***
CA Resident	2,529	2,593	2,822	*2,699*	2,874	3,178
Nonresident	608	754	782	*369*	340	579
Resident : Nonresident					*8.5*	*5.5*
Total New	**9,845**	**9,794**	**11,148**	**9,614**	**10,221**	**11,087**
% Nonresident	**21.8%**	**24.5%**	**27.5%**	**16.6%**	**17.4%**	**19.7%**
Resident : Nonresident					**4.7**	**4.1**

Growth of the Undergraduate Population at UC San Diego

Related to the growth in residents, above, the university has been on a growth trajectory as well (**Table 9**). While the 2021-to-2022 drop was a "reset" of sorts, the goal was to then resume our growth trajectory after 2022. We have come very close to the resident and total targets each year, especially considering that 2023 brought a last-minute request from UCOP to increase resident numbers further than originally planned, and that 2024 brought federal-level disaster with the delays and errors in the FAFSA, and an accompanying deadline delay paired with highly

unpredictable behavior by students who were getting their aid packages later, and with things less settled than usual. In this complex environment, San Diego has grown by more than any other campus over the past decade.

Table 9. UC systemwide enrollment (all undergraduates) by campus, 2015-2024

All Campus, Fall term, by Campus

Student lev..	Categories	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Undergrad..	Berkeley	27,496	29,310	30,574	30,853	31,348	30,799	31,814	32,479	33,078	33,070
	Davis	28,257	29,379	30,066	30,718	30,982	31,162	31,657	31,532	31,797	32,273
	Irvine	25,256	27,331	29,307	29,736	30,382	29,638	29,449	28,662	29,503	30,204
	Los Angeles	29,585	30,873	31,002	31,577	31,543	31,636	32,122	32,423	33,040	33,475
	Merced	6,237	6,815	7,375	7,881	8,151	8,276	8,321	8,343	8,372	8,372
	Riverside	18,607	19,799	20,073	20,581	22,055	22,693	22,868	22,911	22,646	22,600
	San Diego	26,590	28,127	28,587	30,285	30,794	31,842	33,343	33,096	33,792	34,955
	Santa Barbara	20,607	21,574	22,186	23,070	23,349	23,196	23,091	23,459	23,232	23,181
	Santa Cruz	16,231	16,962	17,577	17,792	17,517	17,207	17,864	17,502	17,812	17,940
	Total	198,866	210,170	216,747	222,493	226,121	226,449	230,529	230,407	233,272	236,070

The Holistic Review Process

Creation of the Holistic Review Scores

The process of our Holistic Review for first-year applicants can be divided into two stages. In the first stage, readers score each application with consideration of a range of factors derived from BOARS guidance. The scores range from 1 to 5, where 1 is highest/best and 5 is lowest/worst. Readers may also assign 1.5 and 2.5. Two readers read each file. If they differ by one point or less, the final score is the average of the two. If they differ by more than one point, a third reader (usually someone from the professional staff) reconciles the differences. At the end of the first stage, each file has a Holistic Review Score (HRS). The HRS is intended to reflect the entirety of the student's achievements and promises. In the context of the current applicant volume, this means that the readers (including over 200 "external readers" hired each year for this sole

purpose) will provide over 250,000 reads each year as they rate applicants in the second-largest first-year pool in the United States.

It should be noted that the yield of those with the best scores is historically lower than those with lower holistic scores, and those are a small portion of our applicant pool. Thus, applicants with scores toward the middle make up a larger percentage of our admit pool, and ultimately, a larger percentage of our enrolling class each year.

Our statistical analysis showed that the HRS has a very high correlation (about 0.8) with the student's weighted HGPA in the local context (**Table 10**).[12] In a holistic process, which is by definition not weighted to prescribe importance to any one factor over another, we nonetheless train our readers to consider grades as an important part of the score. Readers see multiple GPAs (unweighted, weighted, and "capped" weighted) and also see how the applicant's GPA stacks up against other applicants from the same high school (again, in multiple ways, both weighted and unweighted, and in comparison to both other applicants to this campus and other applicants to all UC campuses combined). The review is designed to see past grade inflation. If a student's GPA is "high" compared to many in the applicant pool, but does not stand out within the school's applicants, that can be telling.

When you also consider that the UCs are charged with giving admission priority to students in the top 9% of their high school (sometimes referred to as "ELC"), it is understandable that grades and grade percentile (within the school) play a significant role in the holistic score, *but definitely do not determine the whole score.*

Table 10. Correlation of High School GPA and the Holistic Review Score

Correlation of Weighted High School GPA Percentile and HR Score					
	F2020	**F2021**	**F2022**	**F2023**	**F2024**
	-0.72	-0.79	-0.79	-0.79	-0.81
Correlation of UnWeighted High School GPA Percentile and HR Score					
	F2020	**F2021**	**F2022**	**F2023**	**F2024**
	-0.63	-0.71	-0.69	-0.67	-0.69

Beyond these highly quantitative factors, holistic readers are trained to look out for a variety of other factors that all conform within the BOARS list of approved considerations in admission and use the PIQs (a series of short essays) and activities lists to determine more about the student's background, potential, and life experiences. While the GPA and GPA percentile may, again, show a strong correlation with holistic score, it is these additional considerations that help

[12] The student's weighted HSGPA expressed as the percentile ranking in their high school.

define differences among a vast and talented applicant pool. This is why applicants with the highest score and a much lower one, for example, may have nearly identical GPA and course taking patterns – and it is a crucial component of the UC philosophy that even among students who look academically similar, we will make distinctions to help us identify students who most espouse the characteristics we seek in the incoming cohort. Note that readers are specifically trained to NOT take a student's preparation into account differently based on their intended major; doing so across the many majors offered here would risk muddying the waters too much, and the premise on which this scoring rubric was built is that holistic review for first-year applicants is based on their general preparation and potential for overall success.

It is a delicate balance to not formulate pre-determined outcomes for each file's score, and yet at the same time ensure a high level of conformity among the few hundred who give these scores. Readers are carefully trained using several dozen selected exemplar files at the start of the cycle; some external readers do not make it past that point such that they never read "live" files for us. Still others will be dismissed later in the cycle if their reads are associated with an unusually high incidence of third reads, or if their volume is not sufficient to keep us on pace. You could even note that a reader falling behind our minimum pace is a less effective one, because seeing fewer files per week makes them less likely to be consistent.

The Shaping of the Class

The second stage utilizes the holistic scoring results to then determine offers of admission that align with our overall goals and limitations for the size of the class. The Selection Committee is made up of the Executive Director of Undergraduate Admissions, the Associate Vice Chancellor of Enrollment Management, and 4-6 other staff from Admissions leadership and the Enrollment Management Data Analytics team. To ensure no one impacts both stages of the process, no readers are included in the Selection Committee, and no member of that committee can be a reader.

This group can strategize throughout the year about how it will approach selection; but the actual process of working from all the holistic scores to decide on who to admit is very concentrated, and involves the group making many rounds of adjustments to its plans over the span of just a few weeks from when readings are complete (late January or early February) to the time when decisions need to be finalized and give time for three other key steps (college assignment, major assignment, and financial aid packaging) before offers of admission go out to first-years in mid-March.

The committee will treat the three different residency groups of the applicant pool as distinct groups based on the space of the campus to accommodate them in carefully planned subsets:

resident, out-of-state, and international. If nothing else, the yield behavior among these categories varies greatly, and we must decide on a number of offers that work backward from this outcome. Additionally, the resident group is where we take a great many more characteristics into account than with the other two. For example, among non-CA high schools, there is no designation of LCFF+ status, there is less robust tracking of A-G coursework by UCOP, and we might think that grading for students at international schools is very different from US grading, such that even if we use the same holistic scoring for all three, we think of it as being composed of different inputs, at least in a broad sense.

In each of the last several years, even as in-state applications have climbed by more than 20,000, we still have a similar number of offers of admission we can make. This is because even though the size of our resident class has grown (as noted above), that growth in capacity has been much less than the growth of the pool. Beginning in 2022, we brought refreshed focus to the process by which offers of admission were determined, to better control for major selection, and to ensure that we selected students in a way that would allow for more granular shaping of the many subgroups of the class, especially by major. At the same time, we have aimed to ensure that increasing selectivity did not result in obligatory decision patterns that constrained our desire to shape the class. As a result, as the pool has grown, the selection committee has had to increasingly limit how often the holistic score alone can lead to the decision, vs additionally taking additional academic and non-academic factors into account – especially the requested major.

Additionally, Admissions/EM sought to be responsive to numerous conversations that revolved around students being admitted to an alternate major instead of a highly popular first-choice one, in hundreds of cases, the student might have been admitted to the university without any major at all, and therefore assigned to undeclared status as opposed to picking it voluntarily. Once considering the reality of those same majors (typically the highly selective ones within Engineering) and their overall capacity, it is understandable that many such students were deeply disappointed in their UC San Diego experience. Rates of satisfaction in the UCUES survey were low from these “forced undeclareds” and other students who could not get into the major they came here to pursue. Meanwhile, some other departments who would gladly accept additional students were not growing – or if they were, it might be through enrollment by students who did not wish to be there and would even say so.

One additional strategy brought to the selection process in 2022 was the use of a robust waitlist – this is a very common best practice across the country in the admissions profession, but for whatever reason, it had been avoided on this campus for several years prior. Simply put, UC San Diego had experienced great fluctuation in enrollment outcomes each year for several years while not using a waitlist. Employing one allowed us to ensure we could make offers of admission with a more conservative, lower number each March and invite additional applicants to let us know if they would be interested later should space end up being available. Then, after

May 1 (the national freshman decision date for most colleges), San Diego goes out with additional offers if possible, and only to students who opted to be on that waitlist. Even then, some of those students decline our offers such that in some years, we go through multiple rounds, and all the way into early July, before finishing our activity. It is also worth noting that we use this same strategy with transfer students, and while that carries some different timing and strategies with it, it is beyond the focus of this report.

Again, part of what we began trying to do more effectively in 2022 was to manage enrollment much more carefully within each department, especially those who were going beyond their ideal capacity. While the waitlist allows us to much more incrementally work our way up to those goals, we continue a longer-term practice of first examining the pool of students who had been admitted in the initial round and accepted their offer, and yet had been admitted to a second-choice major. We first notify those students that we would like to switch them into their first-choice major, and only then do we consider additional admits to that major from the waitlist.

As mentioned earlier, holistic review does not consider a student's likely fit with a specific major they seek. However, in the selection committee, we might make the decision to admit a student, but not into their first-choice major. For this reason, we have additional steps that we take to determine admission to a major even after deciding on who to admit to the university. While that process is not documented in this report, it is important to note its existence in regard to the remedies/future approaches mentioned in later sections.

By dipping further into the pool of applicants vs. simply letting the holistic score determine the bulk of decisions, the Selection Committee has sought to expand access for students seeking majors we wish to grow, and/or for students who come from schools we seek to serve better. And each year, this is a matter of balance, even if we can predict a rough range of the yield rate each year (how many students offered admission will accept that offer and enroll at San Diego), we cannot ever know exactly which students they will be. Last, it is important to note that at no time, does the Selection Committee go "into the weeds" enough to be examining every individual file; that is the purpose of the holistic review, and then the Selection Committee makes categorical decisions from those individual inputs.

The Use of Portfolio in Admissions

Another source of input into the admissions decision for some students is the arts portfolio. UC San Diego Applicants who elect a major in Music, Theatre & Dance, or Visual Arts are offered the opportunity to submit a portfolio of their work. Each Department sets their own arts portfolio requirements. Approximately 50% of applicants who elect an Arts major submit a portfolio.

Some applicants who do *not* elect an Arts major, nonetheless, turn in an Arts portfolio. All submitted Arts portfolios are evaluated by the appropriate Department.

The applicants who submit a portfolio are evaluated along two *parallel* tracks. Their file is evaluated in the two rounds of the normal admissions process, and their portfolio is judged by the departmental portfolio review.

The readers who assign the Holistic Review Score do not take into account the major or portfolio and the departmental portfolio review does not have access to scoring by the readers. The department studies the submitted material and assigns a score between 1 and 5 based on criteria established by the departments and they send the portfolio scores to the Dean's Office, that then forwards to Admissions. While this happens to be the same scale used in admissions, these are very different assessments and are never mixed or averaged together.

If an applicant who submits a portfolio receives a high enough score from the Admissions Office Reader, they will be admitted to UC San Diego regardless of their Portfolio score to their selected major. Similarly, if an applicant who submits a portfolio receives a very low Holistic Review Score from the Admissions Office Reader, they will be rejected regardless of their Portfolio score, no matter how great their artistic talent may be.

However, a portfolio rating comes into play if the applicant who submits a portfolio receives a score in the middle ranges from the Admissions Office Reader. In that case, their portfolio score *could* tip their application one way or another. These considerations happen in the second stage of shaping the class.

None of the Arts majors have a math requirement, except the ICAM majors in Music and Visual Arts (Interdisciplinary Computing and the Arts Major - Computer Music and Music Technology, Visual Arts). The only college with a calculus requirement is Revelle College; this college counts a few Arts majors among its students. With these two exceptions, Arts majors are not obliged to fulfill any math requirement.

Unfortunately, under the current system, once the Arts Departments submit their portfolio scores to the Dean's Office, they receive no feedback about the outcomes of those applicants. The process lacks transparency in this regard. Faculty members who devote significant time and effort to evaluating portfolios never learn what became of the students they recommended -- or whether their assessments had any impact on admissions decisions. Enrollment Management/Admissions makes these decisions available to the School and will be working with the Dean's office in the coming year to ensure a stronger and more consistent feedback loop.

Attempted Remedies for the 2025 Cohort

As the math placement issues became clearer over the past year, Admissions/Enrollment Management has taken steps to adjust the selection process for the 2025 cohort. First, we started calculations of a Math-only GPA; this is something never utilized by any other UC campus, but a natural place to look first for more specific signals that might help in our decision process. This new GPA was unweighted, meaning whether the student took an AP/IB/college/Honors class, the focus was on how well they did in whatever that setting was. Second, we put this GPA to use in parts of the selection committee's work – for applicants with some of the lower holistic scores involved with considering an offer of admission, a low math GPA could result in a student not being offered a spot even if they would have been under other circumstances. This math-GPA cutoff was only utilized if the student's first-choice major was one that requires Math 10 or Math 20 for graduation.

We estimate that this resulted in several hundred students not being offered admission; and along with this, third, we somewhat raised the bar for students from LCFF+ schools. As has been noted elsewhere in this document, despite these three substantive adjustments, the number of incoming students needing Math 2/3B did not decrease; however, the proportion of those needing the remediation who came from LCFF+ schools decreased.[13]

[13] Ironically, this means that we might have identified a solution that is less effective in detecting math readiness issues for students from non-LCFF+ schools. However, we have not had the time to do a complete post-mortem on the connection between the attempted readiness and the outcomes.

Recommendations

Recommendations Addressing the Writing Problem

The Admissions workgroup concluded that the complexities of language, literacy, and writing preparation require further study. To determine what data is needed to explore this further, we should include colleagues with expertise in literacy and writing from the humanities, including college writing program faculty. Colleagues with expertise in social science and scientific communication from across campus, including experts from Geisel library, should also be consulted. The new challenges posed by widespread use of artificial intelligence tools make this an important time to examine the state of our incoming students' literacy preparation. We should leverage campus expertise to determine what data we need to assess this preparation. This type of study is an important opportunity to address a rapidly changing literacy readiness among our students.

Recommendations Addressing the Math Problem

The Math Index

We face an enormous uncertainty when judging the math skills of our applicants. The most and least prepared students are easy to identify, but the level of math preparation for the vast majority of applicants is much more difficult to assess based on the information they submit with their application. Furthermore, the yield rate among the top applicants is relatively low because they are more likely to take offers from UC Berkeley, UCLA, or other highly ranked universities.

The first step to addressing this problem is to move away from using overall high school GPA that is calculated with all subjects, to a focus on the math courses in the transcript for those students whose major requires strong math preparation. Yet, as we saw, just calculating the average grade will not be sufficient. The variation among schools in course offerings and quality further obscures the information contained in high school transcripts.

Whereas before 2021 standardized testing helped with identifying incoming students unprepared for majors with high math content, we no longer see test scores from many of our incoming students.[14] Administering the math placement test before admission decisions is logistically impossible. Therefore, we propose a statistical model, which we refer to as the Math Index, to

[14] It is important to note that even when ACT/SAT scores were required for applicants, the score was never used in a robust manner in the admissions process itself; however, it was used in placement, such that it is likely that a much smaller percentage of the incoming class was required to take the MPE compared to now.

extract as much information as possible about the student's math preparedness from their application in a uniform, fair and impartial way. Specifically, the Math Index is our best predictor for how a given applicant would perform on the math placement exam once admitted.

We model the student's math placement outcome (MPO) as a function of information available on the student's high school transcript, including grades, courses completed, and the high school attended. We can refer to these variables as the Math Performance Measure (MPM). Our model weighs them to optimally predict the MPO. Specifically, for student *i*, our measure of $MPM_{ij,}$ (a matrix of variables) is based on the following:

- Grades in the three basic courses (Algebra I, Geometry, Algebra II or Integrated Math I, Integrated Math II, Integrated Math III – these are the Area C requirements)
- The total number of math courses they took beyond the three basic courses
- The types of those math courses: AP, Honors, College etc.
- The topics of those courses: statistics, pre-calculus, calculus etc.
- The average grade in non-basic math courses
- The last year they took a math class
- The student's overall capped weighted GPA
- The student's high school

To create a forecast of the likelihood that an applicant to UC San Diego will be placed into remedial math (Math 2/3B), we use data from prior years of applicants who were admitted and enrolled. At present we are estimating versions of this model that use the UC San Diego math course placement of UC San Diego freshman enrollees in math-intensive majors who arrived on campus in Fall 2023 and Fall 2024. The final model will likely use either a logit or linear probability model to estimate for each student MPO_i, the probability of placement into math 2/3B, as a function of the vector of predictors MPM.

Once the model parameters have been estimated using prior years of data, it can then be applied to a set of future applicants to UC San Diego who are seeking math-intensive majors, for whom the math placement will be crucial. The Math Index for a set of applicants will thus be a function of the information on each student's transcript:

$Math\ Index\ = f(MPM)$ where f is the function estimated using past enrollees.

The Math Index will thus be a predicted probability that the student will have to take Math 2/3B. Put differently, it is an estimate of the MPO (Math Placement Outcome).

Because of the strong evidence we have gathered that probabilities of remedial math placement vary systematically by high school,[15] even after controlling for information in students' high school transcripts, it is essential that this model incorporate information on the high school attended.

How the Math Index Will Be Used

The main guide to admission is still the Holistic Review Score, but the Math Index is used to evaluate the fit between the student's chosen major and their math skills. The Math Index will be used to evaluate any student whose first choice for major is one that requires the Math 10 or Math 20 sequence. The exception is that students admitted to such majors who have already demonstrated mastery of the required high school math content, through earning college credit, or earning the needed scores on AP or IB exams, will not need to take the Math Placement Exam. For this reason, the Math Index will not be needed for such students. Nonetheless, all applicants will be scored for baseline reference and further research, even if the index does not ultimately end up playing into their admission decision.

The workgroup discussed two approaches to using the Math Index. The first is to set a strict cutoff on the Math Index for students whose major will require the Math 10 or Math 20 sequence. The minimum Math Index score could be different for the two and could be decided with input from the Committee on Admissions. The selection committee will also need to consider how differing cutoffs could impact efforts to reach certain target numbers with various departments; for example, among the most selective majors requiring Math 20, the index might be used to fine-tune offers of admission, and other majors that are undersubscribed, a slightly higher index (i.e., higher likelihood of testing into Math 2/3B) may be a good component of efforts to reach an enrollment goal for that specific department.

A second approach, which some members believe is better aligned with holistic admissions, is for the admissions team to make admissions decisions to math-intensive majors holistically, but to keep a running tally during the selection process of the likely number of students who would need Math 2/3B.[16] These two approaches – setting a cutoff probability of placement into remedial math above which admissions to majors requiring math will not be allowed, and keep a

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[15] Early in our work to create the Math Index, in our models predicting UC San Diego math course placement, we tested whether all California high schools that sent students into UC San Diego math-intensive majors in fall 2023 and 2024 have the same grading standards. The probability that the hypothesis of identical grading standards is correct was less than 0.01%.

[16] We recommend that for the 2026–27 academic year, enrollment in Math 2/3B will be no more than ***300*** students.

running count of the expected number of remedial math enrollees as admissions decisions are made – are not necessarily mutually exclusive. Using both approaches as UC San Diego gathers experience with the Math Index could be wise.

We now provide an example of how this second idea of keeping a running tally of the expected number of remedial math would work in practice. The probability that a given admittee both enrolls at UC San Diego and is placed in Math 2/3B, PR, is equal to the product of two probabilities:

PR = Prob(Enrolls at UC San Diego) * Prob(Placed in Math 2/3B)

= Prob(Enrolls at UC San Diego) * Math Index

For example, with roughly one quarter of admittees enrolling at UC San Diego, the first probability might be estimated at about 0.25. If a given student had a Math Index = 0.6, meaning that the estimated probability of being placed into remedial math was 0.6, then this applicant's expected probability of enrolling and taking Math 2/3B is

PR = 0.25 * 0.6 = 0.15.

(This assumes that the two probabilities are independent.) If UC San Diego admits to majors that require math a total of N students who are not exempted from the Math Placement Exam, then the expected number of students in Math 2/3B that fall will be TOTAL_2/3B, which is the following sum, where i indexes the students:

$$TOTAL_2/3B = \sum_{i=1}^{N} PR_i = \sum_{i=1}^{N} Prob(Enrolls\ at\ UCSD)_i * Math\ Index_i$$

The first terms on the probability of enrollment at UC San Diego can be based on a statistical model enrollment probability that incorporates and builds upon the insights of the experience of the professional admissions staff. The second term is the Math Index itself.

The admissions staff would use this running count to admit students in a way that was mindful of campus targets for a maximum number of students who would be expected to need remedial math. This number could be set in consultation between the Committee on Admissions, the Math Department, and Admissions/Enrollment Management. As admissions decisions are made, the admissions team can regularly update the Committee on Admissions and the Math Department on the current value of TOTAL_2/3B.

We reiterate that students who chose majors without Math 10/20 requirements will be admitted without consideration of this math index.

The Maintenance of the Math Index

The Math Index must be evaluated every year by the Committee of Admissions in consultation with admissions staff, with a focus on its ability to predict the Math Placement Outcome. The weights should be adjusted every year as new cohorts provide new data for the calculations. For its first iteration, to be used in winter and spring 2026, data from fall 2023 and fall 2024 admissions will likely be used (reserving fall 2025 admissions for cross validation of the model). But in future years, more years of data on Math 2/3B placements can be used to train the prediction model, leading to more accurate and more precise predictions.

An important improvement that could be made in future years, as the campus gains more years of data on math placements, is that the model could be adapted to predict the probability of placement into Math 2 and Math 3B separately. The former, in its 2023-24 configuration, focuses largely on pre-high school math while the latter focuses on more advanced material typically taught in high school. In fall 2023, however, only Math 2 was offered, and was a hybrid between these courses. This extension would allow separate predictions to be made of the number of freshmen needing Math 2 and Math 3B. It is not practical at the present time as only the fall 2024 math placement data were available at the time the initial Math Index model was developed.

We must be mindful of what statisticians call *selection bias*. Statistical selection bias (SSB) comes from the fact that in future years we would not have data on students the Math Index rejects, and similarly we cannot see the false negative cases, those who we rejected but would have done well. SSB can be small or extensive, and one way to assess its size is to admit a small random sample of students without using the Math Index and compare their Math Index and math placement with the others. UC San Diego admissions policies allow for such an experiment up to 2% of the admitted students.

Over time, the Math Index should also incorporate the **likelihood of graduation** in a student's chosen math-intensive major.

Reassess the Math Requirements by Major

As recommended by the previous workgroup, departments should reassess the actual math needs of our majors (see the Report of the SAWG on math preparation). Majors like Psychology are already split into B.A. and B.S. programs. We should consider similar separations for other large majors.

The difference between B.A. and B.S. and their different math requirements should be communicated clearly to applicants. The name of the B.A. and B.S. majors should be different,

and the application software should follow a decision tree where students are made aware of the differences.

We want to avoid situations where students are enrolled in math-intensive majors but are not able to place into the required calculus sequence in a timely manner (e.g., after the first year). These students are at risk of not succeeding in their major and, as data from the previous workgroup shows, have lower retention rates and longer times to degree. Of course, this can vary from major to major - for example, Psychology BS students require calculus, but not necessarily in the early years; also, there is a less math-intensive BA option. On the other hand, most engineering majors have both lower- and upper-division coursework that makes use of calculus; students who do not complete their math requirements will be unable to make progress towards these degrees. Indeed, data show that few, if any, students who have placed into Math 2 have successfully completed an engineering major. The picture is further complicated by the distribution of students placing into Math 2 among different majors - the majority are majors in Biology and Psychology. Thus, while the downstream effects are severe in engineering majors, the numbers are relatively small, as noted above.

We recommend that the interplay between math placement and majors be further studied. It would require a deeper dive into data around math requirements and student placement patterns. There is already a group of advisors discussing advising strategies for Math 2/3B students - we should build on their work to see what role advising might play (as the previous workgroup recommended). Our workgroup also discussed the possibility of restricting certain math-intensive majors to students who place at least into 3C by the end of their first year. A centralized implementation of this restriction is not trivial and requires further study. However, departments are able to explore pre-major requirements through curricular proposals to the Undergraduate Council. While there are pros and cons with respect to pre-majors, this option is currently available.

Maximizing the Impact of the Summer before Starting as a Freshman at UC San Diego

We recommend a policy change, to be stated in admissions letters, by which every incoming first-year student who needs mathematics for their major must establish their math proficiency by a fairly early date in the summer, whether by taking the Math Placement Exam (MPE) or otherwise submitting college transcripts or AP/IB scores. The MPE result would not impact an applicant’s admissions status whatsoever and is only to help us place the student into the most appropriate initial mathematics course for their major. The requirement to complete by June 1 will be early enough to provide clear guidance (if needed) on registering for the appropriate

summer remedial mathematics course at a US college of their choice. The MPE requirement date of June 1 must of course be adjusted for students admitted off waitlists close to or after June 1. Specifically, the policy would be:

1) Matriculating students who have not met placement criteria and who need math for their major and/or college ***SHOULD*** take the Mathematics Diagnostic Assessment (**MDA**) by ***May 15***. The MTP Group will send results to students with recommended math topics to review.
2) Matriculating students ***MUST*** take the Mathematics Placement Exam (**MPE**) by ***June 1***. However, we *highly recommend* that students complete the **MPE** by ***May 15*** in order to take advantage of summer course offerings at other colleges (see below). Matriculating students that are awaiting AP or IB test scores that can be used for placement are exempt from taking the MPE by June 1.
3) In order to support the goal of students passing Math 3B within their first year, students who obtain a placement in Math 2 or Math 3B are *strongly recommended* to enroll in Community College preparatory mathematics course(s) during Summer semester and/or Fall semester. [17]

High Schools

Establishing a feedback loop with high schools

It is clear that one action we should take is that of notifying high schools that we have seen their students arrive with remedial needs in math, despite having met (and very often exceeding!) A-G requirements in the subject. Taking such a step will enable high schools to rethink their curriculum on a micro- and macro-level but also must be done in such a way that student privacy is preserved. One potential way to approach this work is with the involvement of UC San Diego's CREATE team. CREATE has recently received a new grant from the Gates Foundation that is specifically geared toward helping high schools improve math instruction; they will be working with roughly a dozen school districts in our local area, and the conversations will allow

[17] *For example, the San Diego Community Colleges offer:*
- ***Math 15A*** *(Prealgebra Refresher)*
- ***Math 15B*** *(Elementary Algebra)*
- ***Math 15C*** *(Intermediate Algebra)*
- ***Math 15D*** *(Geometry Refresher)*

the opportunity to speak more broadly with schools about what we see, and how we need their help.

Ultimately, this is a subject that should escalate to the UC system level and the statewide level in K-12, but this campus can make good strides by approaching the topic locally in San Diego. Enrollment Management/Admissions offers to take the lead on working with CREATE on this topic and will need the collaboration of the Math department and possibly other areas to meaningfully ensure that "the tough conversations" take place in the right manner.

Communicating with High Schools About Grade Inflation

Every year, we should evaluate our Math Index and identify schools where in the previous two years, the Math Index systematically over-predicted performance of students on the math placement test. We should advise those schools that we see evidence of grade inflation in their grading practices but also note if there is evidence of low-quality math instruction or the lack of availability of advanced math classes. Meanwhile, when the index is seen to systemically *under*-predict performance, we should ensure the following year's adjustments are done in a way that ensures less risk of needless penalty in the selection process.

Bringing in Line Our LCFF+ Admission with the Other UC Schools

We should bring our enrollment from LCFF+ schools more in line with similarly selective UC campuses. To do so, we should return to the pre-2022 practice for now. It will become more apparent next fall what effect the Math Index has on enrollment from LCFF+ schools, and we will have the option of providing some extra consideration to students from under-resourced schools in the future.

Admissions activity aside, there are other things the state calls on us to do to help LCFF+ schools prior to admission (UCOP 2024). We can

- Partner with community-based organizations to raise awareness of UC requirements
- Provide LCFF+ school students with UC campus experiences, e.g., campus visits, residential programs, and connecting them with UC student peer mentors
- Raise awareness of UC at LCFF+ schools during the fall application period for graduates and during the spring for students in grades 9-11 by conducting additional application, college preparation, and financial aid workshops for students and parents etc.

And there are many things we can do after admission from targeted yield activities and transition support to prevent melt (which refers to the loss of students who accept the UCSD offer in spring

but ultimately do not enroll), to additional support once they arrive. Admissions is already heavily invested in all of these actions, and in the long run, each action plays a part in welcoming and preparing these students.

Recommendations Addressing the Use of Portfolio

We make the following recommendations to improve the use of art portfolios in admissions:

- Clarify what information is sent from the Admissions office to the Dean's office after admissions decisions have been made
- Share that information with Departments (either via the Dean's office or directly from Office of Admissions)
- Share as soon as possible so Departments can work with Admissions to reach out to admitted students, potentially increasing their yield.

Recommendations for the Holistic Review and Selection Process

The following recommendations fine-tune the admissions process to include predicted student success, particularly for math-intensive majors.[18]

1. **Reduce Math 2 Enrollment to Near Zero**

The ultimate target should be to bring Math 2 enrollment close to zero. The Enrollment Management group should work with the Committee on Admissions (CoA) to develop an admissions algorithm that integrates the *Holistic Review score*, *Math Index*, and other relevant factors to achieve this goal.

2. **Develop a Better Methodology to Assess Writing and Language Skills**

Create or adopt a more robust and predictive methodology to evaluate applicants' writing and language skills at the time of admission. This should go beyond GPA and course titles to capture actual preparedness for college-level analytical and compositional work.

3. **Integrate LCFF+ Status into Admissions Decisions**

In collaboration with CoA, develop improved ways to incorporate the LCFF+ status of

[18] This is in line with the 13 guiding principles for admissions established by BOARS, specifically principle 7: "The admissions process should select those students who demonstrate a strong likelihood that they will persist to graduation."

applicants' high schools into admissions decisions. The goal should be to ensure equitable consideration of applicants' contexts while maintaining a realistic assessment of academic readiness.

4. **Improve Cross-Unit Communication**
Strengthen communication and collaboration among academic departments, CoA, and Enrollment Management. Departmental concerns -- especially regarding student preparation for specific majors -- should be heard earlier in the admissions cycle and addressed with greater sensitivity and transparency.

A More Active Role for the Committee on Admissions

The above recommendations reaffirm the Committee on Admissions (CoA) as the central faculty body responsible for overseeing and guiding UC San Diego's admissions process, as codified in Board of Regents Bylaw 40.1. To address the ongoing crisis in student preparedness, CoA must move beyond a primarily reactive review role toward a more proactive policy-setting, evaluative, and coordinating function. Its work should ensure alignment with UC systemwide practices, strengthen accountability, and advance the University's mission of academic excellence and social mobility. Similarly, admissions staff should seek pre-approval for changes in admission standards or processes that could materially alter who is admitted and the admission rates for individual high schools.

Specific responsibilities for the Committee on Admissions include, but are not limited to, the following:

1. **Oversee Math Index Implementation and Cutoffs**
   CoA should provide faculty oversight for the implementation of the **Math Index**, including determining and periodically revising any cutoff thresholds based on evidence of student performance and success.
2. **Refine and Evaluate Holistic Review and Class Shaping**
   In collaboration with Enrollment Management, CoA should help define and update the process for assigning Holistic Review Scores and shaping the admitted class. CoA should receive regular reports tracking correlations between review scores and post-enrollment outcomes, including math placement and graduation rates.

3. **Revise LCFF+ Admissions Practices**
   CoA should oversee efforts to ensure that admissions decisions for students from LCFF+ schools are consistent with other similarly selective UC campuses.

Systemwide Recommendations

Investigating Variation in Grading Standards

We recommend that BOARS should investigate the wide variation in grading standards across California high schools and develop a systemwide response to ensure greater consistency and comparability in academic evaluation. Just as importantly, BOARS should be a part of engagement with schools and districts to deliver the message that aside from grades, we see evidence that students' curriculum – especially in Math – might be misrepresenting the content the school omitted from the instruction plan, or coming up short on the vital factor of *subject matter retention.* Are students being advanced to higher-level math in too careless a fashion, and at the expense of ensuring the student retains core concepts from earlier math?

A Call for the UC System to Consider a Return to Standardized Testing

The majority of the workgroup recommends that our representative on the Board of Admissions and Relations with Schools (BOARS) should advocate for a systemwide reexamination of the possible return to standardized testing, following the lead of some other institutions that have recently reinstated such measures. This recommendation follows directly from the findings in this report that high school math grades are only very weakly linked to students' actual math preparation. In fact, for more than two decades the Mathematics Department has found that out of all available student data, the single best predictor for math placement has been the SAT (math section) score, with the ACT score being an equally good predictor. The Math department still uses these scores as the best predictor for math placement if the student provides this data after they are admitted[19].

Although many other universities also dropped their standardized testing requirement at about the same time as UC, with the onset of the COVID pandemic, several peer universities have now reinstituted the use of standardized tests for admissions. These universities have found that high

[19] For example, an SAT (math) score over 600 (or an ACT score over 21) is an accurate predictor of success in Math 3C, whereas an SAT (math) score over 650 (or an ACT score over 24) is an accurate predictor of success in Math 4C.

school GPA on its own is inadequate for admissions. For example, MIT reproduced the analysis of the UC STTF report and found that at MIT standardized tests provided much needed additional information beyond high school transcripts.[20]

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Akos Rona-Tas, Sociology, Past Chair of Committee on Admissions, Co-chair
Holly Bauer, Analytic Writing Program
Julian Betts, Economics
Ross Frank, Ethnic Studies
Olivia Graeve, Mechanical and Aerospace Engineering
Michael Holst, Mathematics
Sergey Kryazhimskiy, Ecology, Behavior and Evolution
Lisa Lampert-Weissig, Literature
John Moore, Dean of Undergraduate Education
Lisa Portes, Theatre and Dance
Daniel Sievenpiper, Electrical and Computer Engineering, Chair of Committee on Admissions
Paul Yu, Provost, Revelle College

[20] See e.g. this report of MIT's decision from MIT's Dean of Admissions, especially footnote 4.

Appendices

Appendix 1: History of AWP test-taking and placement

	2017	2018	2019	2020	2021	2022	2023	2024
Incoming FY class	5703	6708	6023	6449	7542	6546	7005	7330
> Domestic	4752	5655	5089	5384	6480	5977	6373	6582
> International	951	1053	934	1065	1062	569	632	748
Percent Domestic	*83.3%*	*84.3%*	*84.5%*	*83.5%*	*85.9%*	*91.3%*	*91.0%*	*89.8%*
Took Writing Placement Exam	2423	2256	1844	2030	2832	2863	2240	2109
> Domestic	1681	1648	1403	1332	2140	2575	1916	1663
> International	742	608	441	698	692	288	324	446
Percent Domestic	*69.4%*	*73.0%*	*76.1%*	*65.6%*	*75.6%*	*89.9%*	*85.5%*	*78.9%*
Percent needing exam	42.5%	33.6%	30.6%	31.5%	37.5%	43.7%	32.0%	28.8%
> Domestic	*35.4%*	*29.1%*	*27.6%*	*24.7%*	*33.0%*	*43.1%*	*30.1%*	*25.3%*
> International	*78.0%*	*57.7%*	*47.2%*	*65.5%*	*65.2%*	*50.6%*	*51.3%*	*59.6%*
Needed AWP/Enrolled	1297	1537	1199	1316	1520	1353	1446	1511
> Domestic	726	1017	756	678	932	1124	1210	1185
> International	571	520	443	638	588	229	236	326
Percent Domestic	*56.0%*	*66.2%*	*63.1%*	*51.5%*	*61.3%*	*83.1%*	*83.7%*	*78.4%*
Percent of incoming class in AWP	22.7%	22.9%	19.9%	20.4%	20.2%	20.7%	20.6%	20.6%
> Domestic	15.3%	18.0%	14.9%	12.6%	14.4%	18.8%	19.0%	18.0%
> International	60.0%	49.4%	47.4%	59.9%	55.4%	40.2%	37.3%	43.6%

NOTE: In "Percent" sections of this chart, numbers reflect the proportion of the total incoming class needing the exam, and the proportion who end up enrolling in an AWP course.

Appendix 2: Supporting **Information and Data from the Mathematics Department**

The following materials were provided by the Mathematics Department, presented to the SAWG by the committee member from that department, and discussed during SAWG meetings.

Overview of the Core UCSD Lower Division Mathematics Sequences and Dependencies

HS* Subject C (Math) Requirement: For admission to UC System** → ***Algebra 1*, *Geometry*, *Algebra 2 *(HS Grades 9-11 college prep)*

MATH 2 (Intro to College Math; *workload credit only*) → *Prep for 3B/3C/4C (Math 2 created in 2016 for gaps in Grades 9-11)*
→ *Redesigned in 2023 for gaps in Grades 1-8*

Pre-Calculus: *(Normal entry point for all freshman due to the Subject C Requirement)*

MATH 3B (Foundations of Precalculus) → *Prep for 3C/10A (Math 3B created in 2023 for gaps in Grades 9-11)*
HS → MATH 3C (Precalculus: ***Normal entry point for all freshman***) → *Prep for 10A*
MATH 4C (Precalculus for Science and Engineering) → *Prep for 20A/18*

Calculus: *(Typical entry point for freshman with access to advanced math courses in High School)*

3C → MATH 10AB[C] (Calculus for Biological and Social Sciences) ***Majors:*** *Anthropology, Biochemistry, Biology, Cognitive Science, Economics, Human Development, International Studies, Psychology, …*
Revelle College (10AB)

4C → MATH 20ABC (Calculus for Science and Engineering): ***Majors:*** *Chemistry, Data Science, Engineering, Mathematics, Physics, SIO*
20C/18 → MATH 20D[E] (Differential Equations and Vector Calculus): *Chemistry (20D), Engineering, Mathematics, Physics, SIO (20D), …*

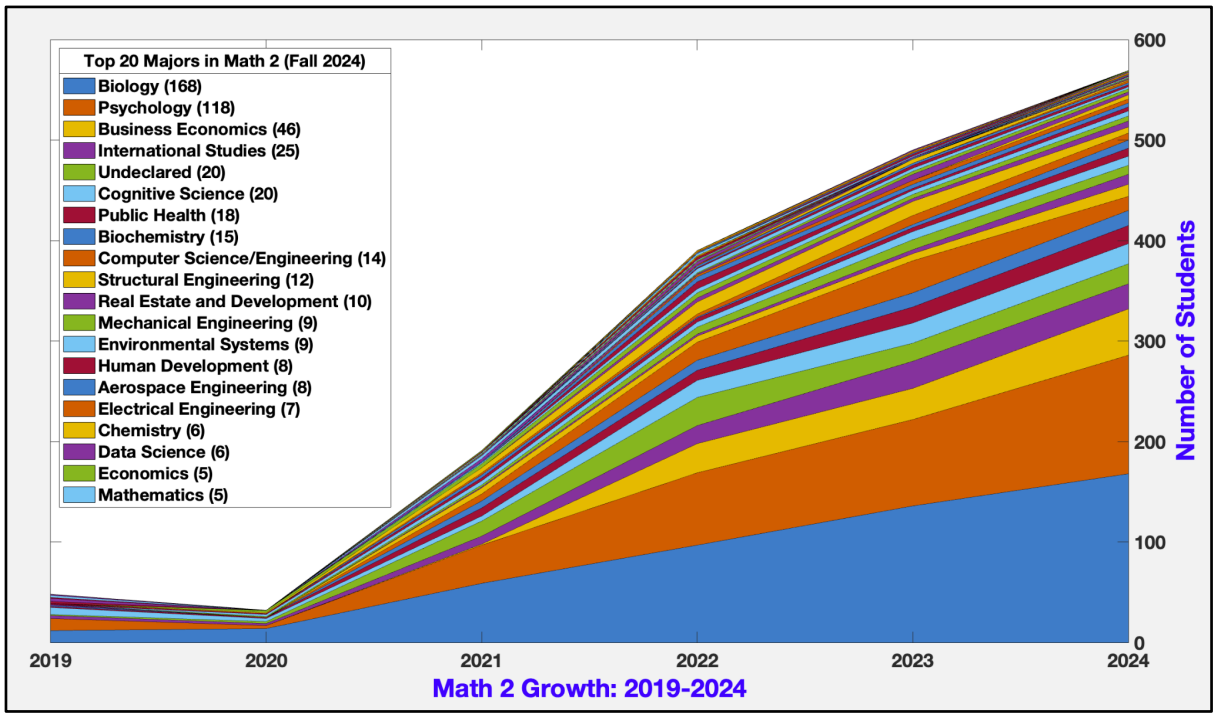
Linear Algebra, Probability and Statistics:

4C/10A → MATH 18 (Linear Algebra): ***Majors:*** *Chemistry, Data Science, Engineering, Mathematics, Physics, SIO*
10B → MATH 11 (Calculus-Based Intro Probability and Statistics): *Anthropology, Biochemistry, Biology, Psychology, …*

Math Placement by Majors in Fall 2024

School	Math 2	Math 3b-c	Math 4c	Math 10a-c	Math 20a-e	beyond	no math
Arts and Humanities	7	16	8	44	30	16	332
Biological Sciences	129	168	20	423	143	169	410
GPS	4	8		5	4	2	21
HDSI	5	16	22	3	97	65	34
JSOE	31	64	105	22	603	204	121
Physical Sciences	23	106	50	118	434	211	78
Public Health	10	18		28	6	5	62
Rady Joint Programs	58	76	16	123	88	8	120
SIO	22	29	12	77	50	5	73
Social Sciences	137	158	27	252	239	75	832
Undeclared	46	66	48	72	217	71	173

Growth of the Math 2 Population by Major (2019-2024)



Results from the Fall 2023 Math 2 Skills Assessment

Math 2 was designed by the UC San Diego Mathematics Department to remediate skills gaps in high school mathematics topics (Grades 9-11), due to the observed need to provide a 10-week on-ramp for a small number of students to our normal precalculus courses (Math 3C and Math 4C). It was first offered in 2016, and from 2016-2021 it successfully served a small number of students (usually less than 100) that needed this additional support in their first quarter at UC San Diego before entering Math 3C or 4C. As noted in the body of the report, the population of students that placed into Math 2 began to grow rapidly in 2022. In Fall 2023, the Math 2 instructors observed a new and alarming spread of skill gaps in the Math 2 students that quarter, with many severe gaps going back to mathematics taught in middle and elementary school.

In response, the Mathematics Department designed and administered a skills assessment test to carefully identify where the students had the most knowledge gaps in elementary and middle school material. The assessment test was designed by the core group of permanent ladder and teaching math faculty who are both subject matter experts and pedagogy experts in mathematics education. The test was designed to carefully follow the California Common Core State Standards in Mathematics, and consisted of 30 questions that covered mathematics topics that are required to be taught in grades 1-8 in all California public elementary and middle schools. Below is a representative sampling of 12 of the 30 questions, covering the three groupings of grades 1-2, grades 3-5, and grades 6-8, along with the percentage of students who took the assessment test and gave the correct answers to that particular question.

1. Fill in the box: $7 + 2 = \square + 6$ (Grade 1, 75%) (Grade 2, 79%)
2. Sarah had nine pennies and nine dimes. How many coins did she have in all?
3. Find $66 + 44$ (Grade 2, 91%)
4. Find $13 - 8$ (Grade 1, 99%)

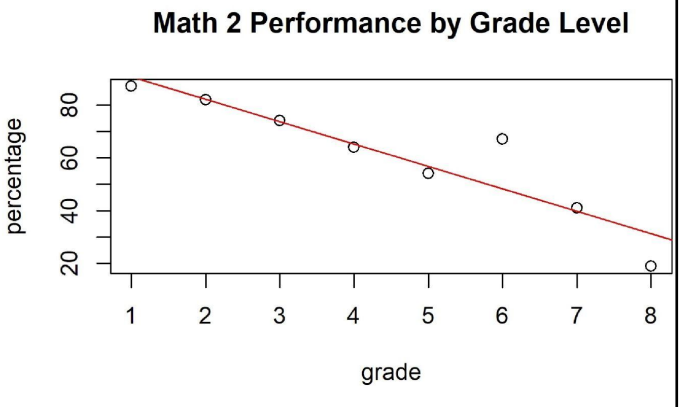
14. Round the number 374518 to the nearest hundred. (Grade 3, 39%)
15. Find $\frac{13}{16} \div 2$ (Grade 5, 34%)
16. Add the mixed fractions $6\frac{2}{3}$ and $4\frac{2}{3}$. Give your answer as a mixed fraction. (Grade 4, 47%)
17. Find $\frac{3}{4} - \frac{1}{3}$ (Grade 5, 63%)

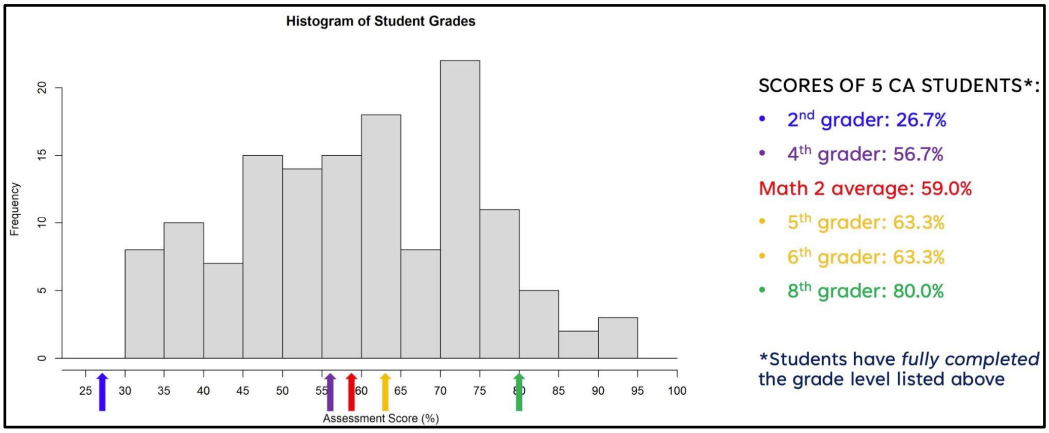
27. Solve $10 - 2(4 - 6x) = 0$ (Grade 8, 18%)
28. Simplify $\frac{8(2) - 4(-4)}{-2(3) - (-4)}$ (Grade 7, 36%)
29. Expand $(s + 1)^2$ (Grade 8, 15%)
30. If $a = -2$ and $b = -3$, evaluate $ab^2 - \frac{a}{b}$ (Grade 8, 2%)

The test was open response (pencil and paper), non-calculator, and students were given 45 minutes to complete the test. It was completely anonymous (students did not put their name on the test), and the students understood that it was not part of their grade. It was positively framed (data to help their instructors adapt the course to their needs), and donuts were given at the end of the test. There was nearly 100% participation (138 students). The scores from the students are given in the table, graph, and histogram below. The table gives the percentage of the Math 2 students taking the test that were able to answer questions correctly from the Common Core material at each grade level 1-8. The graph shows the decay in skills with increasing grade level.

The histogram shows graphically the number of Math 2 students who scored a particular overall average on the test, along with the class average (the red arrow). For calibration, the assessment test was also given separately, under the same conditions, to five California public school students that had just completed each of the grades 2, 4, 5, 6, and 8. The scores from the five public school students are also shown on the histogram (the arrows of colors other than red). These five scores are in line with expectations at each grade level and align closely with the Common Core State Standards as the assessment test was designed to measure.

Grade	Average
1	87%
2	82%
3	74%
4	64%
5	54%
6	67%
7	41%
8	19%





Based on this assessment of the Fall 2023 Math 2 students, in Fall 2024 the Mathematics Department introduced a new course, Math 3B, that was designed to more effectively help the students that had skill gaps only in high school mathematics subjects (such as the roughly 25% of the students appearing in the right-most section of the histogram above from Fall 2023). Math 3B is effectively equivalent to what Math 2 was originally, so that Math 3B now plays the same role that Math 2 did previously during the years 2016-2023. In Fall 2024, Math 2 was then redesigned to focus entirely on skill gaps only in Grades 1-8, which serves the group of students with the most severe math preparation deficiencies; this will be its role going forward, and it is this current version of Math 2 that is being taught in Fall 2025.

Post-Course Interviews with the Math 2 Tutors (2024-2025)

On request from the SAWG in Spring 2025, the Mathematics Department Vice Chair for Undergraduate Education interviewed six of the core AY 24-25 ASC@math tutors in July 2025. (These are the mathematics department tutors that work most closely with Math 2 students during the Math 2 course every quarter.) Five questions were posed in the interviews, the first

two of which were requested specifically by the SAWG. Below is a summary of the responses to the first two questions from all six tutors that were interviewed.

Question 1: *Insight on the disconnect between UC admissions requirements and severe math preparation deficits exhibited by the Math 2 students. In particular, around 20% of Math 2 students (in theory) have passed AP calculus; how can this be reconciled with the student performance in Math 2 and Math 3B?*

- *Tutor 1:* This tutor is shocked that any of the Math 2 students could have passed a precalculus or calculus class. He speculates that perhaps many of them relied heavily on AI or online computing devices in their high school math courses. He mentions that some Math 2 students commented that most students were not doing well in their high school math classes, so it was easy to pass.
- *Tutor 1:* This tutor also noted that some of the Math 2 students had not taken any math during their senior year of high school and as a consequence may have been very rusty.

- *Tutor 2:* This tutor stated that many Math 2 students suffer from dyscalculia and even when they can successfully solve the problems, it takes them an extremely long time to do so.
- *Tutor 2:* He thought that perhaps some of their high school classes were not as rigorous or challenging as college courses.
- *Tutor 2:* Based on his conversations with Math 2 students, the majority of them had never encountered later Math 2 topics in their previous math courses (e.g., factoring)

- *Tutor 3:* This tutor states that she didn't hear any details about the students' high school math courses, but she noted that many students had not been engaged with math for over a year (last math course was junior year), so many of them needed refreshers and review.
- *Tutor 3:* She also noted that it was difficult to answer this question generally since around 90% of the students just worked on ALEKS (or at least kept to themselves) and did not interact with the tutors.

- *Tutor 4:* Some students just want a "refresh".
- *Tutor 4:* Many students hadn't thought about material for a long time and have issues with recall.

- *Tutor 5:* He saw Math 2 students struggling with the amount of material that is covered in the 10 weeks.
- *Tutor 5:* He noted that a problem with high school curricula is that even if you get a D in high school math, it still counts as credit for that course. In his own high school, some teachers would teach "life skills" in high school math class, just using calculators, the internet, and prescribed formulas; classes didn't teach "mathematical thinking".
- *Tutor 5:* He did notice a "lack of student commitment" from Math 2 students, e.g. not actually working on Math 2 homework while at ASC, instead on their phones, etc.

- *Tutor 6:* In her opinion, the biggest trend is that the students did "plug and chug" in high school and didn't think they would need to remember the material. They went through high school just

to pass but without understanding. One of her high school athlete students told her that he was able to pass all of his high school math without attending class because his coach had a special agreement with the teachers.

- *Tutor 6:* In her own high school, students had to solve problems immediately after learning, whereas many Math 2 students don't start homework until days later (too late!). She suggests using more individual work on problems in the lectures so that students have to practice right away.
- *Tutor 6:* She noted that many of these students feel shame and are scared and shy about asking questions.
- *Tutor 6:* She observed that many Math 2 students struggled with a language barrier, phrases such as "no more than" or "strictly greater than"...but noted that the meaning of these phrases are included in the student guide, so they need to use the guide more.

Question 2: *Observations of Math 2 students' strengths, weaknesses and ability to progress?*

- *Tutor 1:* This tutor explained that when students ask him a question, his approach is typically to work through an example with them and then ask them to solve a parallel example without his help right afterwards. He estimated that of the Math 2 students with whom he interacted over the 24-25 AY, only about 10% had the ability to correctly solve the parallel example on their own, and the other 90% were "completely lost" when attempting the parallel example.
- *Tutor 1:* This tutor noted that many of the Math 2 students with whom he interacted did not remember seeing the majority of the Math 2 course topics in any previous course.

- *Tutor 2:* This tutor had the impression that the majority of Math 2 students have seen the earlier Math 2 topics but not the later topics.
- *Tutor 2:* Stated multiple times that the students suffer from dyscalculia
- *Tutor 2:* Students struggle greatly with notation, and ALEKS cannot identify these difficulties, e.g. most Math 2 students do not know that $a-b$ equals $-b+a$, and there are no ALEKS problems which address these subtleties and advance these students' notational fluency.

- *Tutor 3:* She noted that the earlier Math 2 material seemed to be easier for the students, but that fractions, factoring, and especially word problems were challenging for the students.
- *Tutor 3:* She estimated that around 1/3 of the students with whom she interacted could successfully move forward on their own with a similar problem after asking her questions about a problem.
- *Tutor 3:* She noted that students are very slow (even when they understand how to solve the problems).
- *Tutor 3:* She noted that students struggle because they cannot use calculators.

- *Tutor 4:* It was difficult for this tutor to make conclusions regarding the most difficult topics for the Math 2 students because they were all at different places in their ALEKS and asked a wide variety of questions.

- *Tutor 5:* He noted that the Math 2 students appeared to understand algebra with integers, but they had severe difficulty with fractions and could not do any algebra with fractions. Students who didn't seem to have questions before the fractions material got completely lost with fractions. They also had severe difficulty with exponential functions (N.B. Does he mean exponents?); many students said they'd never seen exponential functions.

- *Tutor 6:* In her opinion, the "technical part" of Math 2 is not the main challenge. The persisting issue was the "shift in thinking" when you move into a math problem, such as this genre (N.B. She makes up an example): "A coyote and a wolf run away from a rock (at different given rates); in two hours how far away from each other will they be?" The students don't even know where to start, how to use variables, etc.
- *Tutor 6:* The "logical thinking" part is the biggest struggle for them.
- *Tutor 6:* They could do mental math on integers, but most of them struggled with fractions.
- *Tutor 6:* Many of them struggled with notation (open vs. closed brackets).
- *Tutor 6:* Most of them struggled with trigonometry.