

**Testimony for the Joint Oversight Hearing of the
Assembly Committee on Higher Education and Assembly Committee on Education
*Overview of Course Requirements for Purposes of College Admission***

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Thank you, Chairman Fong and Chairman Muratsuchi, for the opportunity to address this joint hearing. I am Linda Darling-Hammond, here in my capacity as President of the California State Board of Education. I am also President of the Learning Policy Institute, an independent education research organization.

We are here to discuss recent changes in the expectations for math curriculum enacted by the BOARS Committee at the University of California and how those changes will affect schools and students. However, this is just the tip of a set of much bigger issues that touch on the governance of public education, the future of STEM learning in California, the state's economy, and our collective future, which I will also raise.

The acronym BOARS stands for the Board of Admissions and Relations with Schools, and while BOARS decisions are connected to UC admissions (as well as those of CSU since CSU agreed to abide by BOARS decisions), BOARS effectively has no relationship with K-12 schools. There is no governance or required consultative relationship with the K-12 system.

BOARS is a unique committee. There is no other state in the nation that has a higher education body which prescribes and approves the content of specific courses for high schools, like the A-G courses. This set of courses must be met by all in-state applicants in order to be eligible for admission. (Ironically, out-of-state applicants to UC do not have to meet these requirements. Although they are asked to use the A-G requirements as a guide, there is no approved course list for them or their schools to follow.)

The Current Issue

The issue before this committee began with an effort last summer by a group of UC faculty to change a set of decisions about the high school curriculum their colleagues on BOARS had made a decade earlier, in 2013.

The 2013 decision was the result of an effort to coordinate an approach to curriculum across the sectors after the Legislature and the State Board adopted the Common Core State Standards for Mathematics (CCSSM) in 2010. These standards, adopted by more than 40 states, were an attempt to modernize the US math curriculum and are based in part on what other, more

successful countries do in mathematics. (The US has ranked well below international averages in mathematics for the last two decades since the international PISA tests were launched.)

In 2013, BOARS made a decision in response to the new Common Core standards to expand options in math and encourage courses in data science, statistics, discrete math, financial algebra, and others. In its [*Statement on Basic Math for All Admitted UC Students*](#), it said:

BOARS recognizes that this is a period of transition in mathematics instruction, moving from traditional course sequences to new courses and sequences. Within the CCSSM, there are multiple pathways to meet the college-ready standards, and BOARS encourages the development of such new approaches.... The key is to ensure that students have met the standards of the Common Core State Standards for Mathematics, not that they have completed a specific course.

Similar moves had been occurring across the country and indeed the world, as math curricula have been updated to respond to new areas of mathematics and technology -- including data science, more sophisticated statistics, and computer science -- that did not exist when the Committee of 10¹ issued its list of recommended courses for American high schools in 1892. That list of math courses -- Algebra, Geometry, and Algebra II -- was adopted by BOARS shortly after it was established in 1920 and looks the same today.

A Nonpublic, Non-Consultative Process

The fact that BOARS had been willing to consider innovations around the century-old curriculum was discovered by some UC faculty when the State Board of Education was adopting its new mathematics curriculum framework in 2023, because the curriculum framework referred, appropriately, to the existing A-G requirements. This led to a rushed effort to reverse the 2013 decision made by their earlier colleagues before the framework was adopted. The State Board was informed only a few days before its meeting in July 2023 that BOARS had held a non-public meeting the Friday before our Wednesday meeting and wanted to request changes to the framework, which had been revised several times in response to extensive public commentary over 3 years. The Board staff reached out multiple times to try to get clarity on what had been decided in the Friday meeting, which was not public and did not have clearly recorded decisions, and received competing accounts from various people present at the meeting.

Our goal at that time was that the University's decision be accurately represented in the vote on the framework. Finally, on the morning of the vote (July 12th), while in the process of considering the item, the Board's staff was able to get a formal statement from the University, communicated by Monica Lin on behalf of the University Senate.

¹ The Committee of Ten was appointed by the National Education Association and chaired by the President of Harvard University, Charles Eliot. It prescribed courses for all areas of high school education then contemplated for the small proportion of students who attended high school.

I read this statement -- which was handed to me as we were deliberating for our vote -- aloud to the board as we made in-the-moment changes to the text of the framework so that it could be as accurate as possible at the time of the vote.

At the University of California, and across higher education, there is always debate over curriculum and pedagogy amongst faculty. On Friday, July 7, the Board of Admissions and Relations with Schools (BOARS) continued an ongoing dialogue on what advanced mathematics courses may satisfy the math requirement for undergraduate admission. There has been continued discussion about the adequacy of a small number of data science courses—not data science broadly—in the context of our systemwide student preparedness expectations. During the Friday meeting, BOARS voted to establish a working group to examine the criteria that determine whether a course is considered ‘advanced math’ and to draft a charge for their undertaking over the coming months. As BOARS’ workgroup begins forming and developing its charge, the University will still recognize the existing advanced math courses approved to fulfill the subject requirement, including pre-calculus, calculus, linear algebra, trigonometry, statistics, discrete math, and courses in data science, for this year’s applicants to the University.

The Board’s goal was to accurately portray the decisions of UC. We had already removed references in the framework to the use of other courses to validate Algebra II. Because the statement was indeterminate, we voted to amend the framework further as needed following the vote when the UC had a clearer set of decisions available.

A Rushed and Confusing Aftermath Inattentive to the Needs of the K12 System

Since then, the process has been incredibly confusing to the K12 field. This past winter an Area C working group was convened, and its judgments were affirmed by BOARS in January of 2024. The decisions of these bodies changed the criteria for course classifications in two ways. First, they made clear – as we had hoped they would -- what courses could validate Algebra 2 / Math 3. In Stage 2 (June of 2024), the workgroup also created new classifications: a category “3,” labelled as “recommended” and “4,” presumably not recommended, raising a lot of new questions for the field.

This approach has proved problematic because the criteria for reclassifying courses into these categories were not clear. The working group took the unusual step of evaluating and naming classifications for 4 specific courses (AP Statistics, CourseKata, YouCubed, and Introduction to Data Science) before they had set criteria for the evaluation -- and in a manner that raised questions about what the criteria were and whether they had been accurately and fairly applied. While AP Statistics was designated for category 3, at least 1 of the other statistics and data science courses designated for category 4 has been [evaluated](#) by curriculum experts as having very similar content that meets the stated criteria. A request for re-evaluation of the course content with proper materials and criteria in hand did not occur, leaving the field looking for both clarity on the criteria and an understanding of what an appeals process would be.

Given that there are more than 2000 courses being taught in California that are counted as some version of statistics and data science, and the UC approves each course, it has appeared that all would need to be individually reviewed for reclassification in the coming year. While the university admissions office indicated that the “recommended” designation would not have a particular bearing on admissions, k-12 districts, educators, parents, and students believe recommendations of the university are important and will seek to understand and respond to it.

The communication about this reclassification process further said that decisions about classifications would be made between February and June of 2025, ending just a few months before the start of the school year, leaving many schools and districts with inadequate time to plan for the courses, teachers, and number of sections needed for the following fall. I wrote a letter to the UC Board of Regents in July, asking for clarification and time for high schools to respond and plan thoughtfully for the coming school year (See Appendix A.)

This confusing situation was somewhat clarified last week when the University sent out a High School Articulation Special Bulletin that abandoned the designation of “recommended” courses and noted that it would put all of the data science and statistics courses in the same category – now called “Other math” -- along with courses like computer science, discrete math, quantitative reasoning. The Bulletin confirmed that these classifications would be made merely by title, rather than seeking to distinguish among courses by content. This is expeditious, even if a bit imprecise. However, the system still needs to review and approve “Advanced Math” courses that could validate Algebra II along with any contentions about the categorization of individual courses – now set to occur by February 2025. It also needs to review all of the courses that are revised for reclassification – now slated to occur between February and August 2025. The K-12 school year for most schools in California begins in August, leaving potentially no planning time for courses that emerge from that process at that time.

This still leaves dilemmas likely to be untreated until the following school year, such as innovative courses that have integrated the content of Algebra II into a course labelled as Data Science (something educators in San Diego, for example, spent years accomplishing), that do not fit neatly into the preset boxes

This rushed timeline could leave some poorly considered decisions in its wake. We can look forward to less well-coordinated and clearly articulated teaching as courses are reshuffled and faculty must be recruited. Given the ongoing math teacher shortage the state experiences, which leaves almost no pool from which to recruit and often requires on-the-job preparation of untrained teachers, and the time needed for strong preparation of solid courses, the complex scheduling process needed for creating a high school master schedule, and the time needed to counsel students so that they take what they need, planning and implementation may be very difficult especially in our highest need schools. Hurriedly assembled courses taught by underprepared teachers are not a recipe for success for developing students’ mathematical expertise.

The Current Dilemma

I want to be clear that these problems are not of BOARS making – nor of the efforts of the committed faculty members who have been involved in this process. We have inherited a fragmented and antiquated governance structure for education in California. There is no established mechanism to coordinate between and among higher education segments and K12, or to do so with business and labor with both an educational and an economic lens on what our curriculum should be to prepare students to succeed in this rapidly changing world. Nor is there an established mechanism for BOARS to coordinate with K12 colleagues, to hear from the public, or to hold open hearings or receive comment in the way that the legislature, State Board and other public bodies must do in making decisions.

So, we find ourselves in a situation where important curriculum decisions about the types of courses to be offered to our high school students, and the specific content of those courses, are driven not by local governing boards, nor by the Legislature or the State Board of Education, but rather by a committee of professors that changes annually and which can change policies at any time with these rapid changes in membership. These professors, and those who review courses using their criteria, may be making the absolutely right decisions, but they do not have the benefit of the structured public engagements and drafting processes that include a wide range of experts, educators from K-12 and post-secondary institutions, and K-12 parents and students who help sensitize us to the realities of the work on the ground that needs to be considered when changes are made.

The many public laws and regulations we have designed to ensure a coherent, transparent process with accountability can be rendered moot by this nonpublic process. For example, if, as BOARS has proposed recently, an entirely new subject area requirement is added as Area H (which would require for admissions and determine the content of Ethnic Studies courses), local high schools would have to make significant course, curriculum and professional development changes rapidly. If not, they would place their students in jeopardy of being ineligible for UC and CSU. And many districts require all of their students to meet these requirements in order to graduate. The A-G (or potentially A-H) course content requirements do not have to be consistent with policies adopted by the State Board of Education or the Legislature. This can wreak havoc on the complex and multifaceted course offerings and schedules in high schools.

There currently appears to be little understanding of the fact that in our large public education system at the TK-12 level, it takes time to develop, assemble resources for, and properly staff, prepare for, and schedule courses that are appropriate for the diverse set of students who make up the system, or that there is a separate governance system in place that also needs to act.

I understand how this can happen. I come from the higher education system, having held endowed professorships for nearly 30 years at Columbia and Stanford Universities. Our own institutions can be challenging to change from within, and when we look to shape the preparation of the students who will be joining us, we often do not have the benefit of familiarity

with our sister institutions of primary and secondary education, which makes it even more difficult to navigate. This is why it is so essential that decisions with deep and far-reaching consequences for high schools must be coordinated.

The Bigger Issues

There are much bigger issues that we need to contend with. These recent issues have occurred around the edges of the math curriculum specified in 1892 as it was organized into the course content and Carnegie units of the times. But we are in the midst of generational changes that will require us to address many more fundamental issues in the state.

As we all know, the economy has been changing rapidly and the recent rise of AI has accelerated changes in the employment landscape, displacing both workers doing routine jobs and those in white collar jobs. The nature of jobs is also changing. A 2023 study by the [McKinsey Global Institute](#) estimated that in just a few years, by 2030, activities that account for up to 30 percent of hours currently worked across the US economy could be automated, both eliminating many jobs and radically changing the nature of others. Similarly, [Brookings](#) estimated that 25% of U.S. jobs (36 million) would likely be automated by 2030. Forrester Research (2020) projected that AI and automation technologies could eliminate 29% of jobs by 2030 while also creating new jobs for 13% of the workforce. These estimates are within just the next *five years*. More extreme transformations of many more occupations are anticipated quickly thereafter.

Nearly one in 4 [job postings](#) across a wide range of fields include at least some data science skills that involve analyzing, visualizing and communicating with data, and the demand for jobs using computer science skills is expected to grow by more than 25% by 2032.

But fewer than half of California high schools even offer computer science, and only 1/3 of high schools that serve large numbers of students of color and low-income students do so. Courses like computer science are considered “other math” courses in the new A-G framework, eligible for admissions, but there is little room in the high school course sequence for most students to take them – and no encouragement for schools to design and develop them.

We have curriculum gridlock in California, especially in math. The preferred sequence of courses is Algebra, Geometry, Algebra II, Pre-Calculus and Calculus – a 5 course sequence that often requires students to start taking high school math in 8th grade and uses up nearly all of their options. The legislature has just added Personal Finance to the list of courses that must be taken in high school – which is a very important set of life skills. In combination with all the other requirements, which also have grown, there is very little opportunity for choices.

There may be better ways to organize the high school math curriculum: removing redundancies between Algebra I and II, perhaps integrating Algebra II with data science and statistics as San Diego did and [Washington State](#) as done, reconsidering pre-calculus – which is in large part a review course, ensuring that room is made for data science, computer science, and other courses supportive of burgeoning career pathways. In fact, our current sequence of math

courses is not the basis for high school math in any of the highest-achieving and most equitable countries in math -- such as Japan, Korea, Estonia, and Finland, whose policies were reviewed in the curriculum framework. All these countries offer an integrated math sequence (Math 1, 2, and 3) that has also recently integrated data science to a large degree. This framework is both more successful for students and gets them to an array of higher-level math courses, including but not limited to calculus, more quickly and efficiently

Currently, we are a captive of course counting based on the outdated Carnegie Unit – invented in 1906 – which, when combined with lists of course requirements, often prevents integration of courses and ideas. The Carnegie Foundation, which established the Carnegie unit, has recently announced its intention to get rid of it, and to replace it with a means to recognize competencies rather than seat time. This recognition of skills and competencies is a theme in the Governor’s Master Plan for Career Education, And a growing number of states are moving to adopt policies to move in this direction in both k-12 and higher education. Clearly, we need mechanisms to work toward a consensus on a 21st century curriculum.

One additional aspect of our math crisis is the severe shortage of math teachers we have experienced for the last decade. The higher education system now produces just half as many teachers as it did in 2004, with the greatest decline in our public UC/ CSU system. This has meant that half or more of the math teachers entering our schools for nearly the last decade have been underprepared and uncertified, disproportionately placed in our highest need schools – leaving schools unable to adequately staff the high school courses prescribed, which undermines achievement. No matter what courses are required, if they cannot be well-taught to all of our students, we are holding hostage both their future and our own as a state.

The Questions Before Us

The questions before us extend beyond how we will get through the stresses of the current school year and include questions about how we will get through the huge transformations we will face over the next decade and beyond.

How can we organize a coherent means for the state to act in a coordinated way to evaluate our economic needs, our students’ educational needs and then organize curriculum and teaching to meet them, along with the demands of the disciplines?

How can we respond to the obvious needs for flexibility and innovation in the curriculum – and more importantly, in the development and recognition of competencies -- as the world of work is changing at a breathtaking pace?

How can we ensure that we can productively teach the courses that produce these competencies – since the curriculum, whatever it is, will not teach itself?

I raise these bigger questions because I believe the future of California as a high-tech economy and of our current students who will enter this world depends upon it.