

I. Roll Call

2017-18 Assembly Roll Call February 14, 2018

President of the University:

Janet Napolitano

Amy Powell

Academic Council Members:

Shane White, Chair

Robert May, Vice Chair

Lisa Alvarez-Cohen, Chair, UCB

Rachael Goodhue, Chair, UCD

Maria Pantelia, Chair, UCI

Sandra Graham, Chair, UCLA

Susan Amussen, Chair, UCM

Dylan Rodriguez, Chair, UCR

Farrell Ackerman, Chair, UCSD

David Teitel, Chair, UCSF

Henning Bohn, Chair, UCSB

Olof Einarsdottir, Chair, UCSC

Henry Sanchez, Chair, BOARS

Karen Duderstadt, Chair, CCGA

Tanya Golash-Boza, Chair, UCAAD

Michelle Yeh, Chair, UCAP

Edward Caswell-Chen, Chair, UCEP

Roberta Rehm, Chair, UCFW

Jeffrey Richman, Chair, UCORP

Joshua Schimel, Chair, UCPB

Los Angeles (8)

Noel Boyle

Mansoureh Eghbali

Kym F. Faull

Roman Koropecykj

Sandra Loo

William Marotti

Peter Tontonoz

Dorothy Wiley

Merced (1)

Shawn Newsam

Riverside (2)

Thomas Cogswell

Manula Martins-Green

San Diego (5)

Anna Joy Springer

Deborah Hertz

Robert Kluender

Elizabeth Komives

Joseph Pogliano

Berkeley (5)

Victoria Frede-Montemayor

Fai Ma

Daniel Boyarin

Christopher Kutz

Mark Richards

San Francisco (4)

Elena Flowers

Marek Brzezinski

Leah Karliner

Vineeta Singh)

Davis (6)

Stephanie Dungan

Robert L. Powell

Brenda Schildgen

Scott Stanley

S.J. Ben Yoo

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Santa Barbara (3)

Bjorn Birnir

Susan Cassels

Eric Matthys

Santa Cruz (2)

Kimberly Lau

Dorian Bell

Irvine (4)

John Dobrian

Henry Weinstein

Masashi Kitazawa

Secretary/Parliamentarian

George J. Matthey

MEETING OF THE ASSEMBLY OF THE ACADEMIC SENATE

December 13, 2017

MINUTES OF VIDEOCONFERENCE MEETING

I. ROLL CALL OF MEMBERS

Pursuant to the call, the Assembly of the Academic Senate met on Wednesday, December 13, 2017. Academic Senate Chair Shane White presided and called the meeting to order at 10:00 am. Senate Director Hilary Baxter called the roll of Assembly members and confirmed a quorum. Attendance is listed in Appendix A of these minutes.

II. MINUTES

ACTION: The Assembly approved the minutes of the June 14, 2017 meeting as noticed.

III. ANNOUNCEMENTS BY THE CHAIR**▪ Shane White**

University Budget: The Governor will release a proposed budget for the University in early January, but the University does not expect the budget to reflect the Governor's prior commitment to a 4% base budget increase for UC. In addition, a federal tax reform bill making its way through the U.S. Congress includes provisions that will have negative financial impacts for the University and its students.

The University's response to last year's State Auditor report on UCOP budget practices and administrative spending is due in April. UCOP accepted the Auditor's recommendations, including those related to improving UCOP budget and accounting practices around travel reimbursement, staff compensation, and accounting procedures for systemwide academic programs and presidential initiatives.

In September, the Academic Council endorsed a [set of principles](#) to guide UCOP's review of budgets for centrally-funded programs and services in the Division of Academic Affairs and the consideration of cuts to those programs. The principles support giving priority to programs that benefit the core UC academic mission and that support multiple campuses, in a process that includes input from the Academic Senate.

GSR Unionization: The Governor has signed [Senate Bill 201](#), amending the Higher Education Employer-Employee Relations Act to expand the definition of "employee" to include all UC student employees, and providing Graduate Student Researchers with the opportunity for union representation beginning January 1, 2018. The University had requested a veto of the bill, based on concerns that unionization could alter the faculty-student educational relationship from mentor-mentee to employer-employee. UC now has a neutral position on the bill and is considering the best process for managing its implementation.

SVSH and the Regents: The University of California Student Association passed two resolutions calling for the removal of UC Regent Norman Pattiz following substantiated allegations of sexual harassment and workplace misconduct.

IV. ANNOUNCEMENTS BY UNIVERSITY SENIOR MANAGERS

- **Janet Napolitano, President**
- **Michael T. Brown, Provost and Executive Vice President**
- **Nathan Brostrom, Executive Vice President and Chief Financial Officer**

State Audit: President Napolitano said that she accepts responsibility for UCOP's interference in the surveys administered to campuses as part of last year's State Audit. She is focusing on reforming policies and procedures, improving governance, mending key relationships, and re-setting UCOP's relationship with the campuses. The re-set will involve changing the organization of the President's Advisory Group; increasing her one-on-one meetings with campus leaders; streamlining UCOP approval processes; delegating more authority to the campuses; and considering other ways to streamline the UCOP bureaucracy.

In addition, the President said she is acting on three Academic Council recommendations for improving University governance: 1) appointing a senior faculty advisor not currently involved in the day-to-day operation of the University to advise her on ideas and proposals; 2) enhancing the Provost's role and including the Provost in all major decisions; and 3) incorporating Senate leadership into the President's Advisory Group.

Faculty Salaries: President Napolitano met with the University Committee on Faculty Welfare last week to discuss faculty salaries. She said recognizes the importance of competitive faculty salaries and the need to address the salary gap, although decisions about faculty salaries must also take into account the larger UC budget situation.

University Budget: The 2013 budget agreement between UC and the Governor promised UC annual 4% base budget increases through the Governor's term, and authorized the University to implement modest inflation-based tuition increases beginning in 2017-18. However, UC has learned that the Governor may propose only a 3% increase to UC's budget. In addition, the State has sequestered \$50 million from the University pending its progress 1) implementing recommendations in the State Auditor report; 2) completing Activity-Based Costing pilot projects at UCR, UCD, and UCM; and 3) demonstrating a good faith effort to meet a 2:1 freshman to transfer enrollment ratio on all campuses. UC believes it has made progress in these areas sufficient to warrant release of the funds. The Regents will discuss a proposed 2018-19 University budget in January after more is known about the State's intentions.

Retiree Health: The President is establishing a working group to assess the retiree health care benefit and explore potential strategies for preserving the benefit that ensure its long-term financial viability. The group will begin work in January and include representatives from the Academic Senate, represented and non-represented staff, retiree groups, UC Health leadership, and campus leadership in the areas of budget, Human Resources, and administration.

Federal Tax Legislation: The Congressional Conference Committee has reached an agreement on a federal tax reform bill. UC will conduct an analysis of the final bill after more details are known. UC opposed both the House and Senate versions of the bill, and directed advocacy

efforts against the potential repeal of the higher education tuition tax waiver benefit, tax-exempt bond financing options, Unrelated Business Income Taxation, and charitable giving. UC engaged its Advocacy Network (UCAN) in a call-to-action campaign that delivered more than 4,000 messages to the CA congressional delegation about the impact of the bill. UC also accelerated an Advance Refunding Bond sale, in anticipation that the tax-exempt bond provisions would pass.

DACA: The University's "belt and suspenders" approach to preserving the Deferred Action on Childhood Arrivals (DACA) program seeks action both in Congress and the courts. In September, the University sued the Trump administration over its decision to end DACA, and in November, it filed a joint motion asking the U.S. District Court to allow DACA to continue pending a final ruling on the main motion. Hearings on UC's request for a preliminary injunction will begin on December 20. UC anticipates a quick ruling in recognition of the March 5 termination date for DACA. Democrats in Congress are also working on a compromise bill that combines preservation of DACA with increased funding for border security.

Q: Does the agreement with the Governor for a 4% increase exist in writing, and what recourse does the University have if the Governor reneges? Would the University raise tuition in response?

A: The University can express disappointment, but the framework negotiated with the Governor was not a contract, and a formal written agreement that excludes the Legislature could also hurt the University. An additional shortfall in State funding would be another argument in support of a tuition adjustment. The University has not made a final decision, but is considering an in-state tuition increase of 2.5% (\$288), a student services fee increase of 5% (\$54), and a nonresident tuition increase of 3.5% (\$335). Roughly 60% of CA resident students would pay none of the increase and close to 50% would see additional financial aid benefits from the increase.

Provost Brown: Provost Brown noted that he was deeply honored to join the University as its chief academic officer in September. The President has asked him to increase connections with faculty to ensure that UCOP's policy considerations are well-seasoned with academic concerns and consultation. He is touring UC campuses to learn how the Division of Academic Affairs can best support their missions. His first trip was to Merced, which has risen quickly in academic standing, demonstrating the University's commitment to supporting its newest research campus's aspirations to a UC level of excellence. Provost Brown said he wants to help make the case for improved State support of graduate students and programs, and wants to work with the campuses to consider pedagogical innovations that maintain academic excellence and advance inclusivity and faculty diversity. He said he supports efforts to address the faculty salary gap. He said the plan to address the State mandate to fund 1,500 new undergraduates with \$15 million redirected from UCOP resources focused on reducing administrative expenses and shielding academic programs.

UC Sesquicentennial: UC will celebrate its 150 year anniversary in 2018. The year-long event kicks-off in January with an interactive timeline featuring an individual associated with each of the 150 years. President Napolitano will give a series of talks focusing on the past, present, and future of the University. In addition, the Provost is working with the Academic Senate to organize an academic conference intended to highlight the importance of the University's academic mission to California and the world; convey the faculty's passion around UC's

teaching, research, and service missions; and foster a deeper understanding of and appreciation for the University.

UC Path: UC Path will be deployed at UC Merced, UC Riverside, and the Associated Students of UCLA effective with January 1 paychecks. The original December 2017 deployment plan included the greater UCLA campus and medical center, but data conversion issues that arose during testing that made it difficult to guarantee success. UCLA and UCOP made a joint decision to delay deployment at UCLA until at least August 2018.

V. UNIVERSITY COMMITTEE ON FACULTY WELFARE REPORT

▪ Roberta Rehm, Chair, University Committee on Faculty Welfare

Retiree Health: In June, UCFW learned about a UC administration proposal to eliminate the 70 percent floor on the University's contribution to the retiree health care benefit. The item was postponed to the November Regents meeting after the Senate and other constituencies expressed strong concerns. Over the summer, UCFW analyzed cost projections and financial models for retiree health and found that the benefit is sustainable. At the September Council meeting, the President announced her intention to postpone action and assemble a working group charged with making recommendations to the Regents about retiree health affecting the 2019 budget.

Faculty Salaries: UCFW has been working with UCAP, UCPB, and UCAADE to identify goals and priorities for addressing the faculty salary gap between UC and its Comparison 8 group of institutions. In its meeting with President Napolitano on December 8, UCFW noted that the total remuneration gap between UC and the Comparison 8 has been growing and that UC's benefits no longer compensate for lagging salaries. The salary gap has consequences for faculty recruitment, retention, and educational quality; exit surveys show that uncompetitive salaries are the biggest factor in faculty decisions to leave the University. Chair Rehm said she was encouraged by the President and Provost's acknowledgment of the salary gap and their commitment to restoring UC faculty salary competitiveness. 8.4% is the accepted figure for the gap.

Gold Book: In January, a UCFW-led Task Force will begin reviewing the UC Police Policies and Administrative Procedures manual (the "Gold Book") and other systemwide public safety directives and policies. The task force also will consider the creation of a standing systemwide public safety advisory board that would advise UCOP on policing policy and review annual reports from campus public safety advisory boards.

Leave Policy: The Office of Academic Personnel has agreed to initiate a systemwide review of UC policy around leaves and other family accommodations, particularly in an effort to equalize the ability of quarter- and semester-based campuses to award the same period of Active Service-Modified Duties to their faculty.

MOOP: UCFW's Health Care Task Force has received cost savings data from the recent consolidation of maximum out-of-pocket (MOOP) expenses in UC Care, and is awaiting experience and usage data to see if any pattern of disadvantage emerges in any subpopulations or treatment groups.

VI. REPORTS OF STANDING COMMITTEES

A. Academic Council

▪ Shane White, Chair

State Audit: Chair White discussed a recent State audit of the University and actions taken by the Regents at their November 16, 2017 special meeting pertaining to the President's conduct during the audit. The April 2017 State Auditor report on UCOP budget practices and administrative spending included 33 recommendations to UCOP for changing or examining budget and accounting practices, including those related to travel reimbursement, compensation, and accounting procedures for systemwide academic programs and presidential initiatives. UCOP accepted the recommendations and is examining budgets for all centrally-funded programs and services.

However, the Auditor also found that UCOP had interfered with the Auditor's confidential campus survey about the quality of UCOP's services. In response, the Regents commissioned an investigation led by former CA Supreme Court Justice Moreno. The Regents discussed Justice Moreno's [report](#) in a special closed meeting on November 16, and produced a [statement](#) criticizing the President for her role in the interference but also supporting her continued leadership.

The Academic Council held a special meeting on November 17 to discuss the matter, and the [minutes](#) of that meeting record Council's concern. At its subsequent November 29 meeting, Council asked the President to make three governance improvements: 1) the appointment of a senior advisor not otherwise involved in the day-to-day operation of the University, possibly a former Senate chair; 2) the elevation of the Office of the Provost to its historic level of responsibility and its inclusion in the President's cabinet; and 3) the formal or informal inclusion of the Senate chair in the President's cabinet or major planning meetings.

Chair White encouraged Assembly members to bring the documents to the attention of their faculty. He noted that although UC administrators broke no State laws or statues, the Moreno report depicts a troubling failure in governance, ethics, and leadership. He added that the State has imposed on UC a series of damaging directives related to the budget, enrollment, and employee welfare. The University needs strong and stable leadership that can make an effective case to the State for full funding of the University's mission and its continued autonomy. Creating a leadership vacuum at this time would not help the University. Nevertheless, the Senate should monitor the current administration's ability to advance the University's priorities in the upcoming budget cycle.

Assembly members noted that they were encouraged by the President's response to Chair White's three requests, but the Senate should monitor their implementation and effectiveness. Others questioned the genuineness and candidness of the President's apology and expressed support for a separate Senate appraisal of the situation based on publically available material. It was noted that Senate bylaws give the Assembly the right to communicate with the President and also provide a process for the Assembly to memorialize the Regents on matters of Universitywide concern. It was noted that a memorial is a profound action that should not be taken lightly. It was agreed that the Assembly should consider making a statement directly to the President that her mistake was a violation of expected ethical behavior.

ACTION: A motion was made and seconded to authorize Academic Council to appoint a group of Council members to draft a letter for the Assembly's review at its next meeting. The motion passed unanimously with one abstention.

VII. SPECIAL ORDERS

A. Consent Calendar [None]

B. Annual Reports. [Bylaw 120.D.3](#) requires that standing committee annual reports be included in the first Assembly agenda of each academic year.

VIII. REPORTS ON SPECIAL COMMITTEES [None]

IX. PETITIONS OF STUDENTS [None]

X. UNFINISHED BUSINESS [None]

XI. NEW BUSINESS [None]

The meeting adjourned at 1:30 pm

Minutes Prepared by: Michael LaBriola, Academic Senate Analyst

Attest: Shane White, Academic Senate Chair

Attachments: Appendix A – Assembly Attendance Record, Meeting of December 13, 2017

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Chair, UCD
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Farrell Ackerman, Chair, UCSD
David Teitel, Chair, UCSF
Henning Bohn, Chair, UCSB
Olof Einarsdottir, Chair, UCSC
Henry Sanchez, Chair, BOARS (absent)
Karen Duderstadt, Chair, CCGA (absent)
Tanya Golash-Boza, Chair, UCAAD
Michelle Yeh, Chair, UCAP (absent)
Edward Caswell-Chen, Chair, UCEP
(absent)
Roberta Rehm, Chair, UCFW
Jeffrey Richman, Chair, UCORP
Joshua Schimel, Chair, UCPB (absent)

Berkeley (5)

Victoria Frede-Montemayor
Fai Ma
Ted Slaman (alt for Daniel Boyarin)
Christopher Kutz
Kristie Boering (alt for Mark Richards)

Davis (6)

Stephanie Dungan
Robert L. Powell (absent)
Brenda Schildgen
Scott Stanley (absent)
S.J. Ben Yoo (absent)

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Irvine (4)

Arvind Rajaraman (alt for John Dobrian)

Los Angeles (8)

Rafael Ostrovsky (alt for Noel Boyle)
Mansoureh Eghbali (absent)
Kym F. Faull
Roman Koropecykj (absent)
Sandra Loo
William Marotti
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Thomas Cogswell
Manula Martins-Green (absent)

San Diego (5)

Anna Joy Springer
Deborah Hertz
Robert Kluender
Elizabeth Komives (absent)
Joseph Pogliano

San Francisco (4)

Elena Flowers
Marek Brzezinski (absent)
Leah Karliner
Vineeta Singh (absent)

Santa Barbara (3)

Bjorn Birnir (absent)
Susan Cassels
Eric Matthys

Santa Cruz (2)

Kimberly Lau (absent)
Dorian Bell

Secretary/Parliamentarian

George J. Matthey

Legislative Ruling on Bylaw 55 Voting Requirements
Committee on Rules and Jurisdiction
December 21, 2017

The Committee on Rules and Jurisdiction of the Academic Senate of the University of California (UCR&J) renders the following Legislative Ruling in regard to the interpretation of Senate Bylaw 55. In two cases in Bylaw 55.D for extension of voting rights on personnel matters to Emeritae/i department members, it is stated that the requirement for such extension is a “two-thirds majority vote by secret ballot of those faculty entitled to vote on the cases in question” under various provisions of the Bylaw. The set of members to which the two-thirds proportion applies is explicitly stated as the entire membership class, and UCR&J rules that extension of voting rights may not be made without an affirmative vote of two-thirds of the entire membership class, not merely of those voting.

In response to the specific questions posed by this request for Legislative Ruling:

Question 1: As outlined in Senate Bylaw 55.D.4.b, a specific proportion of votes is required to extend voting rights to emeritus faculty. From what population is this passing proportion counted? Does a passing vote require a 2/3 majority of the people who actually voted, or a 2/3 majority of all those who were eligible to vote?

Response: The passing proportion is counted from the entire set of members of the faculty eligible to vote on the matter.

Question 2: Broadening the question to all other Senate bylaws in which a specific proportion of votes is required for an action, is the denominator of that proportion the entire population of eligible voters or the population of eligible voters that submitted a specific vote (i.e., yes, no, or abstention)?

Response: The set of members is specified explicitly in the Bylaws noted below, except in the case of Bylaw 35. Only in the case of such an “unqualified” requirement is the outcome of the vote determined by the members present and voting.

Question 3: If the denominator is the entire population of eligible voters, how are non-votes (those faculty who were eligible to vote but did not actively participate by logging yes, no, or abstention) supposed to be counted?

Response: Faculty who did not vote have abstained (there is no vote of abstention), so the question concerns faculty who were eligible to vote but who have not voted. Given that the requirement calls for a two-thirds vote of all eligible faculty, those who have not voted are counted as if they have voted in opposition. A two-thirds vote in favor requires that two-thirds of the population vote in favor.

Rationale for the Ruling

There are other Bylaws which require two-thirds votes, and in all but one case, the set of members is specified. Bylaw 115.F specifies “two-thirds of the votes cast in a mail ballot,” Bylaws 116.E and 120.C specify “two-thirds of all voting members of the Assembly present,” and Bylaws 51, 75, 115.F, 116.E, and 205.B.6 specify “two-thirds of the votes cast in a mail

ballot of the voting members of the Academic Senate.” (Bylaw 35 is the only one in which the term ‘two-thirds’ is not qualified.) Bylaw 55.D.4.a, regarding non-personnel matters, qualifies a majority vote by “of the total non-Emeritae/i Academic Senate membership of the department,” with the language “of the total” absent from the qualification for a two-thirds vote on personnel matters. The reason for this difference is that only a sub-class of the total non-Emeritae/i Academic Senate membership of the department (the class being specified elsewhere in Bylaw 55) is entitled to vote regarding personnel matters.

There is a clear contrast between the set of members specified in Bylaw 55 and sets of members specified in numerous other Bylaws. If the requirement were for less than two-thirds of the entire body of eligible voters, it would have been stated that way. The two authoritative manuals of parliamentary procedure, *The Standard Code of Parliamentary Procedure* (“Sturgis,” the manual of the Academic Assembly) and *Robert’s Rules of Order*, clearly state that where a qualified population of voters is stipulated, a majority, two-thirds, etc. vote is based on a proportion of the specified population.

V. REPORTS OF STANDING COMMITTEES

Academic Council (continued)

- Shane White, Chair

2. Amendment to Academic Senate Regulation 424.A.3 [ACTION]

Following a [systemwide Senate review](#), the Academic Council recommended at its January 31, 2018 meeting that Senate Regulation 424, which describes the area “d” (laboratory science) requirement for freshman admission, be amended as noted below.

Justification for Revisions to Senate Regulation 424

Regulation 424.A.3 prescribes the laboratory science requirement for freshman admission. The proposed revisions derive from recommendations made by a faculty working group to the Board of Admissions and Relations with Schools. They also reflect feedback from a systemwide Senate review of the proposed changes.

The key revisions to Senate Regulation 424.A.3 include:

- 1) Increasing the minimum area “d” requirement from 2 units (3 recommended) to 3 units, while continuing to require 2 units of coursework that “provide basic knowledge in at least two of the fundamental disciplines of biology, chemistry, and physics.” One unit is equivalent to a year-long course.
- 2) Changing the name of the area “d” subject requirement from Laboratory Science to Science.

Expanding the Science Requirement to Align with the NGSS Course Models

The changes align UC’s subject area expectations more closely with the new expectations for high school science curricula based on California’s adoption of the Next Generation Science Standards (NGSS) for K-12. The CA NGSS reframe high school science curriculum into four core categories — Physical Sciences, Life Sciences, Earth and Space Sciences, and Engineering, Technology and Applications of Science. The implementation of the CA NGSS provides high schools with three possible course models. Many schools may choose the integrated three-course model, which incorporates Earth and Space Science into each of three years of Biology, Chemistry, and Physics. Alternatively, the CA NGSS four-course model is a single-discipline model that adds a year of Earth and Space Science on top of three years of Biology, Chemistry, and Physics. Finally, the three-course “Every Science, Every Year” model allows for full integration across the core disciplines (Biology, Chemistry, and Physics).

The revision to Senate Regulation 424.A.3 will increase the minimum area “d” requirement from 2 units (3 recommended) to 3 units. The policy will continue to require 2 units of coursework that “provide basic knowledge in at least two of the fundamental disciplines of biology, chemistry, and physics.” The changes will hold all UC applicants accountable to more solid academic preparation through evidence-based inquiry that is the foundation of CA NGSS. The work group discussed a proposal to include language “recommending 4 units,” but was concerned that UC recommendations are often interpreted by students, high school counselors, and school districts as *de facto* requirements that could reduce students’ flexibility to explore other disciplines and disadvantage students in under-resourced schools, although currently 95% of UC applicants already take more than the two required years of area “d” science.

Expanding Science Course Options

In addition, BOARS has proposed broadening options for science disciplines that can fulfill the three-year area “d” requirement, so that in lieu of taking a third course from among the three core disciplines (biology, chemistry, physics) listed in the regulation, students could select a third course from other disciplines reflected in the CA NGSS, including earth and space sciences, interdisciplinary sciences, computer science, engineering, and applied sciences. The A-G Guide (<http://www.ucop.edu/agguide/a-g>

[requirements/d-lab-science/index.html](http://www.ucop.edu/aguide/a-g-requirements/d-lab-science/index.html)) will include specific examples of courses that could fulfill the requirements not explicitly mentioned in the Senate regulations. The changes will align the requirement with CA NGSS language that defines student performance expectations not only around laboratory science practices but also around scientific and engineering practices that emphasize critical thinking and the acquisition of quantitative reasoning skills.

The attached chart (see *Area D Addendum: Q&A*) details examples of how high schools might implement each of the three possible NGSS-aligned course models approved by California and how their mode of implementation could affect how students fulfill a new three-year area “d” requirement. High schools are expected to concentrate on implementing the CA NGSS to meet state accountability standards, so at least at first, most high school students are likely to follow their school’s chosen course model in year one, two, and three, leaving students to pursue a course outside of the three- or four-course model in year four of high school, if at all. A three-year area “d” requirement would not prevent a school from implementing a four-course model, but it may make it less likely that students will select the third science course from outside the three core disciplines.

BOARS does not support adding any other discipline to the regulation as an additional core science discipline alongside biology, chemistry, and physics, believing that the two years of core area “d” science continue to provide the strongest possible foundation. However, BOARS also believes that additional science courses will also help prepare students for college-level work, and additional flexibility around the third science course will make the third year as broadly inclusive of other disciplines as possible, while ensuring that such courses meet UC faculty’s criteria of a science course that can fulfill the area “d” requirement. To this end, BOARS supports maintaining the requirement that area “d” courses include a laboratory component. In other words, all area “d” approved courses must include authentic investigations consistent with the practices of the scientific field.

Any area “d” course, including options for the third year of science, will be required to meet the nine specific UC faculty-approved course criteria and eight CA NGSS science and engineering practices articulated in the A-G Guide (<http://www.ucop.edu/aguide/a-g-requirements/d-lab-science/index.html>). Those criteria expand on the basic language in the Senate regulation to provide specific guidance to schools about acceptable disciplines and course content. High schools and districts refer to them when developing a course for possible area “d” approval, and UCOP analysts consult the criteria when reviewing course submissions. It would be up to high schools to provide evidence that their proposed area “d” course aligns with UC’s criteria.

Moreover, BOARS understands that the definition of “laboratory” has evolved such that computer science and engineering curriculum can be framed in the context of current area “d” criteria that are based in experimentation and the scientific method. So for example, specific computer science and engineering courses that incorporate CA NGSS concepts and performance expectations could be considered and approved for area “d.” UCOP currently accepts courses based on an integrated science curriculum and approves them for area “d” if they meet the faculty’s current course criteria. UCOP would expect the high school curriculum designer to indicate whether they are following an integrated science model or a single-discipline model.

Name of Area D Requirement

The revisions propose changing the name of UC’s area “d” subject requirement from “Laboratory Science” to “Science.” BOARS based this recommendation on input from experts who noted that the term “laboratory” is outdated in the context of the CA NGSS and should be broadened to better reflect the four core NGSS categories — Physical Sciences, Life Sciences, Earth and Space Sciences, and Engineering, Technology and Applications of Science. The more general title of “Science” covers a broader range of NGSS-aligned science fields rather than only traditional laboratory bench science, and provides greater

clarity to course designers and UCOP analysts seeking to certify that a given course meets the area “d” criteria.

BOARS believes the revisions will help connect the University’s academic preparation expectations much more closely with the curriculum reform efforts of California high schools given the new direction K-12 science curriculum is taking under the CA NGSS.

ACTION REQUESTED: The Assembly is asked to endorse the Academic Council’s recommendation to amend Senate Regulation as noted below.

<http://senate.universityofcalifornia.edu/bylaws-regulations/regulations/rpart2.html#r424>

424. Candidates applying for freshman admission on the basis of a transcript of record from a secondary school in California must satisfy the course work requirements specified in this regulation. (Am 2 Jun 77; Am 26 May 82; Am 3 May 90; Am 24 May 00) (Am 17 June 2009)

A. Course Requirements

1. Unit Requirements

For the purpose of this Regulation, a unit consists of a year-long college preparatory course approved by the University at the applicant’s high school, in one of the following subject areas: History/Social Science, English, Mathematics, **Laboratory** Science, Language Other Than English, Visual and Performing Arts, and College-Preparatory Electives. A minimum of 15 units must be completed in grades 9-12 as specified in paragraph C of this Regulation. However, courses in Mathematics and Language other than English taken in grades 7 and 8 may be included in the required 15 units if the courses are accepted by the applicant’s high school as equivalent to high school courses that meet the a-g requirements of SR.424.A.3. At least 7 of the 15 required units must be completed during the applicant’s last two years in high school. A minimum of 11 units must be completed before the end of grade 11. (Rev 4 May 1995) (Am 17 June 2009) (Am June 2013)

2. Exception to the Unit Requirements

Notwithstanding Paragraph A.1 of this Regulation, a campus may elect to admit an applicant who does not present the required minimum 15 units prior to high school graduation, provided that the applicant has completed 11 units before the end of the grade 11, including those specified in Paragraph A.3 of this Regulation. Campuses should exercise this option sparingly, and only when an applicant presents a strong overall record of academic achievement that is at least comparable to the records of other applicants admitted to the campus. (Am 17 June 2009) (Am June 2013)

3. Specific Subject Requirements

The following subject requirements must be satisfied through the completion of approved courses of study as provided in Bylaw 145.B.5.

- a. History/Social Science, 2 units. One unit of world history, cultures, and historical geography; and, one unit of US History or one-half unit of US History and one-half unit of Civics or American government. (Am 17 June 2009)
- b. English, 4 units. College-preparatory English composition and literature. (Rev 4 May 1995) (Am 17 June 2009)
- c. Mathematics, 3 units. Four are recommended. Must include the topics covered in elementary and advanced algebra and two- and three-dimensional geometry. (Am 17 June 2009)

- d. ~~Laboratory Science~~, ~~2~~ 3 units. ~~Three are recommended.~~ Must provide basic knowledge in at least two of the fundamental disciplines of biology, chemistry, and physics. (Am 17 June 2009)
- e. Language other than English, 2 units. Three are recommended. Both units must be in the same language. (Am 17 June 2009)
- f. Visual and performing arts, 1 unit. Must be a single, year-long course in dance, drama/theater, music, or visual art. (Am 17 June 2009)
- g. College preparatory elective, 1 unit. Additional approved a-f courses beyond the minimum required, or courses that have been approved specifically in the 'g' subject area (Am 17 June 2009)

Area D Addendum: Q&A

1. *What are the Next Generation Science Standards, and who decided on these standards for California?*

In September 2013, the State Board of Education voted unanimously to adopt the [Next Generation Science Standards for California Public Schools](#), Kindergarten through Grade 12. The California Next Generation Science Standards (CA NGSS) present a unique opportunity for the California Department of Education, K-12 schools/districts, and community stakeholders to reset science education to more effectively prepare students with the knowledge and skills they need to understand and shape our increasingly technology-driven world. The state's NGSS Systems Implementation Plan includes a process for developing a CA NGSS curriculum framework (adopted by the State Board of Education in November 2016) and for reviewing and endorsing aligned instructional materials and resources (scheduled for November 2018). From incorporating science and engineering practices into instruction, to using project-based learning and other instructional strategies, the aim is to achieve dramatic and necessary transformations in how science is taught in every California public school to prepare students for college and future careers.

2. *What are the state's expectations behind implementing new science curriculum aligned to CA NGSS?*

Despite California's current minimum high school graduation requirement of two years of science, the K-12 science curriculum framework adopted by the State Board of Education in 2016 provides high schools with the options of implementing a [3-course model](#) or a [4-course model](#). Furthermore, the framework includes guidance for teachers of these models in using classroom assessments to gauge student learning. Because California's high schools operate largely under local control, science course offerings and the sequence of those courses are district-level decisions. The State Board has approved a new NGSS-aligned state summative exam, which will be given in high school for the first time in spring 2019 for all high school students to take in their last year of science. Many districts across the state align their local high school graduation requirements with the "a-g" requirements to position as many students as possible for success in college.

3. *What might be the resource impact on schools to shift from two to three years of required science for area "d"?*

Based on recent data, 97% of the high schools (public and private) from which UC undergraduate applicants are graduating offer three or more area "d" courses. For public schools in particular, California's new [Local Control Funding Formula](#) (LCFF) provides baseline funding to all schools. Supplemental funding is also granted to schools for each student who is an English learner, eligible for a free or reduced-price meal, or identified as foster youth. Schools with 60% of students in one of these subgroups receive additional "concentration" funding. The LCFF funding formula provides many previously under-resourced schools with a possible means to offer multiple NGSS-aligned courses if they do not already. Also, the availability of nearly 2,000 UC-approved online area "d" courses may further support schools in their efforts to teach high-quality science classes.

4. *How might students be affected by the shift from two to three years of required science for area "d"?*

Recent data show that 95% of UC undergraduate applicants already take three or more area "d" courses (63% take four or more). Another 2.2% take only two area "d" courses and then complete an elective science course that may well shift to area "d" in light of this proposed policy change. Of the remaining 2.8% of applicants who complete only two area "d" courses and no science electives ($n = 2,852$), about 60% are underrepresented minorities, raising questions about potential differential access to area "d" course offerings. Follow-up analyses of the high schools where this cohort of students are from show that

90% of those schools currently offer 3+ science disciplines. Access to science courses does not present itself as an obstacle for these students to complete additional science coursework. Furthermore, an expansion of the types of courses that may be eligible under area “d,” such as computer science and others, will give all students more flexibility to fulfill an area “d” three-year requirement, as well as provide stronger student academic preparation for college and career.

In addition, to address access concerns across a range of demographics – including race, ethnicity, gender, and socioeconomic status – the state’s science curriculum framework includes [specific guidance](#) to educators about critical actions that can ensure equity and access to science learning for all students. These include building and expanding technology resources and network infrastructures to increase access to online learning opportunities, online learning communities, virtual laboratories, and other digital resources.

5. How will the new policy affect student eligibility for UC admissions?

Given the statistics referenced above, a three-year science requirement will not dramatically affect UC admissions eligibility. The California Science Teachers Association has also found that 4 in 10 California districts have already changed their local high school graduation requirement to three years of science, and 51% of districts align their graduation requirements with UC “a-g” subject requirements.

6. What is the rationale behind the name change for the new area “d” requirement?

Changing the name of the subject requirement from “Laboratory Science” to “Science” brings area “d” more directly in line with CA NGSS by using a broad umbrella term to cover the diverse range of science disciplines – from the core disciplines of biology, chemistry, and physics, to the more integrated or interdisciplinary sciences such as earth and space sciences, environmental sciences, and marine science. This alignment between area “d” and the new science standards also invites K-12 to develop or expand high school course offerings in engineering, computer science, technology, and applications of science.

7. UC currently does not allow earth and space sciences to fulfill the two years of area “d,” so why would it be an option under the new Science requirement?

In the past, the state did not provide standards or a curriculum framework to shape the design of high school courses in earth and space sciences. With the transition to new science standards, high schools are guided by and held accountable to the higher teaching and student learning standards established by the CA NGSS. Both of the [3-course models](#) specified in the new K-12 science curriculum framework are integrated models, with one integrating each of the core disciplines (biology, chemistry, physics) with earth and space sciences. The [4-course model](#) specifies earth and space sciences as one of the four distinct courses, along with the three core disciplines of biology, chemistry, and physics. See summary chart on page 3 for details.

8. If the new science requirement is approved, when will it go into effect?

If the proposed area “d” policy change is approved by the Assembly of the Academic Senate, UC Undergraduate Admissions will implement the policy effective with the UC freshman class entering UC in Fall 2023. The anticipated implementation schedule is as follows:

- 2018-19: Statewide communications campaign for K-12 awareness of UC’s policy change for area “d”
- 2019-20: Incoming high school freshmen are held to completing three years of science in high school
- 2020-21: High school sophomore year
- 2021-22: High school junior year
- 2022-23: High school senior year
- 2023-24: Incoming UC freshmen have completed three required years of high school science aligned to CA NGSS

Options for Satisfying the New Science Requirement

	3 Years of Science	CA NGSS 3-Course Model*	CA NGSS Every Science, Every Year Integrated Model*	CA NGSS 4-Course Model*
1 Year	Core discipline course OR Integrated science course	The Living Earth (integrating Biology and Earth Science)	Integrated Science 1	Life Science/Biology
1 Year	Core discipline course OR Integrated science course	Chemistry in the Earth System (integrating Chemistry and Earth Science)	Integrated Science 2	Chemistry
1 Year	Core discipline (biology, chemistry, or physics) OR Integrated science OR Interdisciplinary science OR Earth & space sciences OR Computer science OR Engineering OR Applied sciences OR Honors science (including Advanced Placement or International Baccalaureate courses)	Physics in the Universe (integrating Physics and Earth & Space Science)	Integrated Science 3	Physics
1 Year	Not applicable	Not applicable	Not applicable	Earth & Space Sciences
		<i>*Note: California has approved three high school course models that are aligned to the new Next Generation Science Standards (NGSS) for K-12. The courses in each model are not required to be taught in a specific sequence. The current listings in the shaded columns provide examples of how a particular course model might be implemented at a school site, which in turn, provide examples of how students might fulfill the new area “d” requirement for UC freshman admissions.</i>		

**Response to UC Campus and UC Academic Council Comments Regarding
Proposed Revisions to Senate Regulation 424.A.3 (Area “d”)
1/25/2018**

Thank you very much for the invaluable feedback on the proposed changes to area “d” (See Appendix A: Summary of UC Campus Comments Regarding Proposed Revisions to Senate Regulation 424.A.3 (Area “d”)). We will address each of the main concerns in the following narrative and underscore the positive impact of sending the proposed area “d” policy revisions to the Academic Senate Assembly for approval and implementation.

Access & Equity

The vast majority of UC applicants (California residents) come from comprehensive high schools (Grades 9-12), high schools (e.g., Grades 9-11 or 10-12), or K-12 schools. These different high school types are increasing their offerings of 3 or more science disciplines, while the remaining high schools with only 1 or 2 science disciplines are declining (See below and Appendix B).

Number of Science Disciplines Offered by High School Type

- 2015-2016 3+ Science Disciplines 90.7% (1713/1888)
 1 or 2 Science Disciplines 9.3% (175/1888)

- 2016-2017 3+ Science Disciplines 92.7% (1772/1912)
 1 or 2 Science Disciplines 7.3% (140/1912)

- 2017-2018 3+ Science Disciplines 93.3% (1803/1932)
 1 or 2 Science Disciplines 6.7% (129/1932)

As previously presented, recent data show that 95% of UC undergraduate applicants already take 3 or more area “d” courses (63% take four or more). Of these applicants who complete only 2 area “d” courses 5% (n = 5,032), about 60% are underrepresented minorities, which raises questions about potential differential access to area “d” course offerings.

A major concern focused on the 5% of students who might become “UC-ineligible” because they have completed only 2 years of science; the California State University's APEP (Academic Preparation and Education Programs Committee) shared this concern as well. In response, UCOP Undergraduate Admissions conducted additional data analyses to examine whether students’ completion of 2 courses is primarily due to an access issue (i.e., high schools are offering no more than 1 or 2 science disciplines), or whether students are taking 2 courses because UC currently requires only 2 science disciplines to fulfill the area “d” subject requirement.

The summary data below and Appendix C highlights the science course offerings at the schools where students took only 2 area “d” courses and took no science elective courses. Of the high schools where this cohort of UC applicants come from (n = ~1,600-1,800 students), 96-97% of the schools actually offer 3 or more science disciplines and only 3-4% currently offer 1 or 2 science disciplines. This evidence suggests that the UC applicants with just 2 science courses completed are aiming to meet the minimum required science

courses for area “d.” Furthermore, the large number of high schools associated with students in this cohort represents approximately 39% (753/1932) of all high schools with registered “a-g” course lists for 2017-18 and reflects a wide spectrum of high school types (less-resourced and well-resourced).

High Schools with UC Applicants Completing Only 2 Area “d” Course

- 2015-2016 3+ Science Disciplines 96.3% (754/783)
 1 or 2 Science Disciplines 3.7% (29/783)
- 2016-2017 3+ Science Disciplines 97.2% (697/717)
 1 or 2 Science Disciplines 2.8% (20/717)
- 2017-2018 3+ Science Disciplines 96.8% (728/752)
 1 or 2 Science Disciplines 3.2% (24/752)

The data analyses point out that the applicants who are “only” taking 2 science courses now are simply following UC requirements; if UC increases the area “d” requirement to 3, 96-97% of California high schools will be able to offer a third science discipline/course for their students. The letter from Jill Grace, President of the California Science Teachers Association (CSTA) (see Appendix D), includes further statistics on the trend of California districts/schools moving in the direction of offering 3-4 science courses aligned to Next Generation Science Standards (NGSS). The implementation of 3-course or 4-course models will very likely continue to grow as more high schools fully align to NGSS, given the number of school districts that have already set their local high school graduation requirements to 3 science courses (see CSTA letter).

Online Science Laboratories

Another concern was that allowing online science labs (synchronous and/or asynchronous) would potentially dilute the science experience. Currently, there are no UC-approved online science labs, as all online science courses are expected to be implemented with non-online lab activities. There is very little educational research literature regarding the failure or success of online labs. If high school online science labs were to be designed, submitted, and approved by UC, they must meet the goals and criteria of area “d” – as with all other subject areas offering online versions of “a-g” courses. Allowing online science labs, even if in a pilot, would provide a golden opportunity for UC to conduct its own educational research on the effectiveness of such a delivery mode in supporting the success of UC undergraduates.

Summary

The proposed revisions to area “d” were presented to ICAS, the Intersegmental Committee of Academic Senates from California Community Colleges (CCC), California State University (CSU), and University of California, on December 6, 2017. Except for the concern from CSU, as referenced earlier, there was no opposition. The impact of changes to area “d” would help improve the student populations/applicant pools to CCC and CSU as well, due to increased science literacy. In turn, transfers from CCC to UC should improve the preparation to science and non-science majors as well. Finally, as several of the UC campuses noted (e.g., Merced), the proposed policy change formalizes an existing status and holds all UC applicants accountable to more solid academic preparation through evidence-based inquiry that is the foundation of NGSS.

With any type of educational policy change like the proposed changes to area “d,” BOARS and UCOP will closely monitor and evaluate its effects on access, equity, opportunity, and fairness.

Prepared by:

Henry Sánchez
BOARS Chair

Monica Lin
Director, Academic Preparation and Relations with Schools & Colleges
University of California Office of the President

APPENDICES

Appendix A Summary of UC Campus Comments Regarding Proposed Revisions to Senate Regulation 424.A.3 (Area “d”)

Appendix B Number of Science Disciplines Offered by High School Type 2015-2017

Appendix C High Schools with UC Applicants Completing Only 2 Area “d” Courses 2015-2017

Appendix D Endorsement Letter from the President of the California Science Teachers Association (CSTA)

Appendix E 2016-2017 Science Course Enrollment in Grades 10-12

APPENDIX A

**Summary of Campus Comments RE
Proposed Revisions to Senate Regulation 424.A.3 (Area D)**

Overall Summary

Campus	Status
Berkeley	Opposed
Davis	Mixed
Irvine	Mixed
Los Angeles	Mixed
Merced	In favor
Riverside	In favor
San Diego	Mixed
Santa Barbara	In favor
Santa Cruz	In favor

Detailed Summary

Campus	Review Committee	Status	Key Comments
Berkeley	Divisional Council (DIVCO)	Opposed	<ul style="list-style-type: none"> 95% of UC undergraduate applicants already complete 3 years of science (“solution in search of a problem”) Not supported by analysis of the 5% of applicants not currently completing more than the required 2 years
	Admissions, Enrollment, and Preparatory Education (AEPE)	Opposed	<ul style="list-style-type: none"> What purpose is served by increasing to 100% completing 3 years? Insufficient discussion of the 5% that would be “UC ineligible”
	Lawrence Hall of Science	In favor	<ul style="list-style-type: none"> Supports the name change Concerns RE access for underserved populations & greater specificity about full alignment with NGSS
Davis	Davis Division of the Academic Senate	Mixed reviews (see below)	
	Admissions and Enrollment (A&E)	Opposed	<ul style="list-style-type: none"> Not clear how UC’s alignment of admissions requirements is promoted by strictly requiring 3 years & how failure to adopt the proposed change would undermine the goals of area “d” Impact on students from lower SES status high schools Alignment with the CSU system
	Undergraduate Council (UGC)	Opposed	<ul style="list-style-type: none"> Similar comments as above A minority in favor argue the new requirement would ensure better educational preparedness of all incoming UC students & requiring 3 years would not represent an unfair burden for students because sufficient accessible alternatives are available if the high school does not offer enough courses
	Committee on Courses of Instruction (COCI)	In favor (unanimously supports)	<ul style="list-style-type: none"> Aggressively publicize the policy change Supports the name change

	University Committee on Educational Policy (UCEP)	Expressed concerns	<ul style="list-style-type: none"> Concerns RE asynchronous lab activities Access to courses may have negative impact on students
Irvine	Irvine Division of the Academic Senate (Council on Educational Policy; Council on Undergraduate Admissions and Relations with Schools)	Recommends continued examination of the potential impact of the proposed changes	<ul style="list-style-type: none"> Unclear how the proposed revisions would better prepare students for a UC undergraduate education Lower resourced public high schools could be unfairly disadvantaged Humanities/Arts applicants could see a decrease in their admissions-competitiveness
Los Angeles	UCLA Academic Senate	In favor (recommends strong evaluation plan to assess the impact of proposed changes and impact)	<ul style="list-style-type: none"> Potential disadvantages for ethnic minority students Expand the meaning of the term “laboratory” rather than removing it Concerns about quality/effectiveness of online courses
	Committee on Undergraduate Admissions and Relations with Schools (CUARS)	Opposes	<ul style="list-style-type: none"> Unclear definitions of fundamental core disciplines in science Courses should require evidence-based learning activities where students make observations by gathering data themselves in order to arrive at reproducible conclusions through systematic inquiry Access to three or more science courses is an equity and access issue
	Undergraduate Council (UgC)	In favor (generally supportive, but request more information before formally endorsing)	<ul style="list-style-type: none"> Timeline and equity concerns Concerns RE removal of the term “laboratory” from the name Impact on student matriculation to each campus No clear plans for assessment of the policy change
	College of Letters and Science Faculty Executive Committee (College FEC)	In favor	<ul style="list-style-type: none"> Concerns about ensuring approved courses satisfy in substance the requirements that are set Concerns RE removal of the term “laboratory” Misalignment of “fundamental disciplines” in proposed policy vs. NGSS
	Henry Samueli School of Engineering & Applied Science (HSSEAS) Faculty Executive Committee (FEC)	In favor	<ul style="list-style-type: none"> Very supportive of proposed revisions; no comments/concerns

Merced	Divisional Council	In favor	<ul style="list-style-type: none"> Supports the recommendation from Undergraduate Council
	Undergraduate Council (UGC)	In favor	<ul style="list-style-type: none"> Proposed revision formalizes an existing status, with the majority of UC applicants already completing 3-4 years of science
	School of Natural Sciences Executive Committee	In favor	
Riverside	Riverside Division of the Academic Senate	In favor	<ul style="list-style-type: none"> Confusion over the reference to “every science every year”
	Committee on Undergraduate	In favor	<ul style="list-style-type: none"> Reservations RE online courses

	Admissions		
	School of Business Executive Committee	No opinion	
	College of Natural and Agricultural Sciences (CNAS) Executive Committee	In favor	<ul style="list-style-type: none"> Consensus that the proposed change would better preparing incoming students
	College of Humanities, Arts, and Social Sciences (CHASS) Executive Committee	In favor	<ul style="list-style-type: none"> The fact that 95% of UC applicants already meet the revised standard provides significant reassurance that the change will not have ill effects Supports the name change
San Diego	San Diego Division of the Academic Senate	Expressed concerns	<ul style="list-style-type: none"> Questioned the need for the policy change given that 95% of UC applicants already complete 3 years Concerns RE disparate impact on underrepresented minority students, how the policy change will be communicated, access to courses, and potential negative impact on non-STEM applicants
Santa Barbara	Santa Barbara Division of the Academic Senate	In favor	
	Undergraduate Council (UgC)	In favor (with reservations)	<ul style="list-style-type: none"> Need to ensure expanded course options meet the goals/criteria of area "d" Some favored a move toward a 4-year requirement, with a minimum of 3 courses from the core disciplines
	Committee on Admissions, Enrollment and Relations with Schools (CAERS)	In favor (with reservations)	<ul style="list-style-type: none"> Concerns about the impact on underrepresented minority students, particularly those from under-resourced schools, who may not have access to 3 years of science courses Recommends BOARS track applicants who do not meet the new requirement and develop measures to ensure these students do not fall through the cracks
	College of Creative Studies Faculty Executive Committee (FEC)	In favor (full support)	
	College of Engineering Faculty Executive Committee (FEC)	In favor (full support)	
	College of Letters & Science (L&S) Faculty Executive Committee (FEC)	In favor (with reservations)	<ul style="list-style-type: none"> Concerns about the admissions eligibility of underrepresented minority students who may not have access to 3 years and quality of online courses as one mechanism to bridge the access gap
Santa Cruz	Santa Cruz Division of the Academic Senate	In favor	
	Committee on Admissions and Financial Aid (CAFA)	In favor	<ul style="list-style-type: none"> Extended science options reflect current integration of these fields (computer science, engineering, applied sciences, etc.) into the scientific process Supported the institution of online labs; extant traditional labs should not be replaced by online ones Supports the name change
	Committee on Courses of	In favor	<ul style="list-style-type: none"> Supports the name change

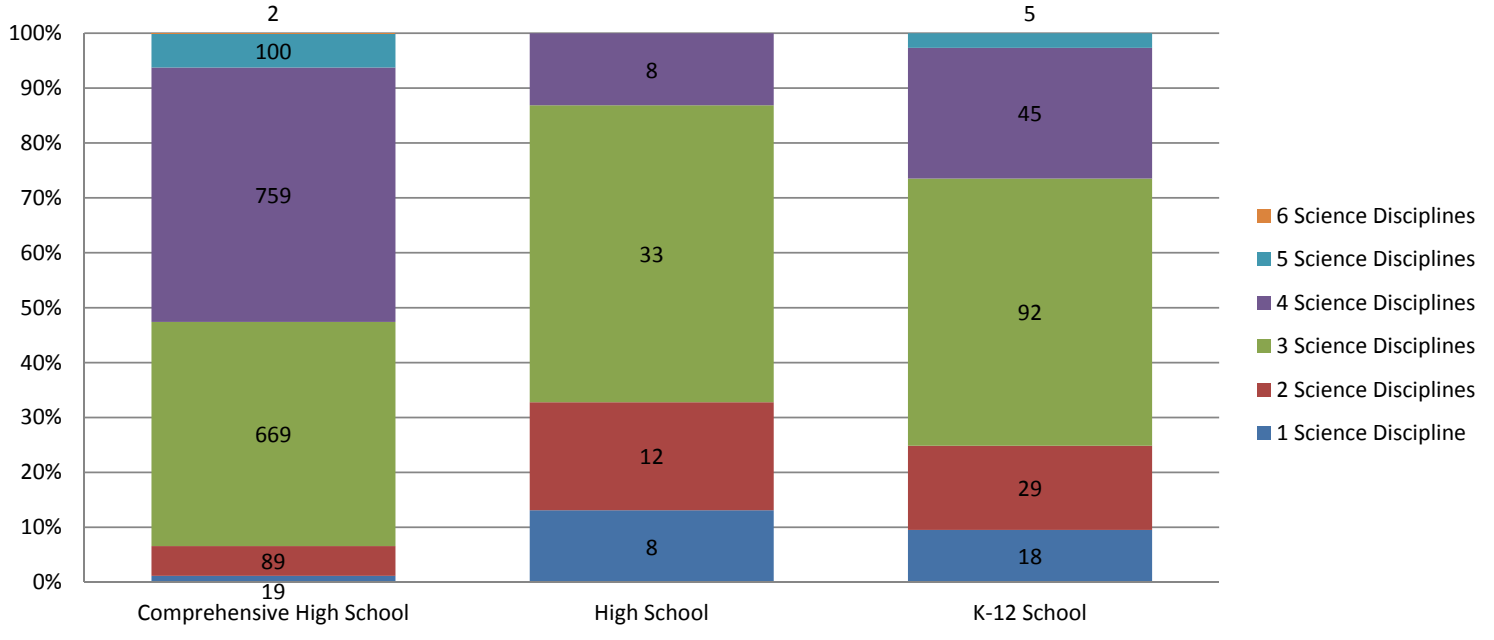
	Instruction (CCI)		
	Committee on Educational Policy (CEP)	In favor	<ul style="list-style-type: none"> ▪ Supports the name change ▪ Concerns RE allowing for entirely virtual learning environments & access to courses
	Committee on Preparatory Education (CPE)	In favor (with reservations)	<ul style="list-style-type: none"> ▪ Supports the name change ▪ Requests data showing how many students matriculate from schools that offer only 2 years of science
	Committee on Teaching (COT)	In favor (with reservations)	<ul style="list-style-type: none"> ▪ Concerns RE possible detrimental impact on students who do not plan on pursuing a science degree ▪ Alignment with the CSU system

Appendix B

Number of Science Disciplines Offered by School Type 2015-2016

School Type	1 Science Discipline	2 Science Disciplines	3 Science Disciplines	4 Science Disciplines	5 Science Disciplines	6 Science Disciplines	Total
Comprehensive High School	19	89	669	759	100	2	1638
High School	8	12	33	8			61
K-12 School	18	29	92	45	5		189
Total	45	130	794	812	105	2	1888

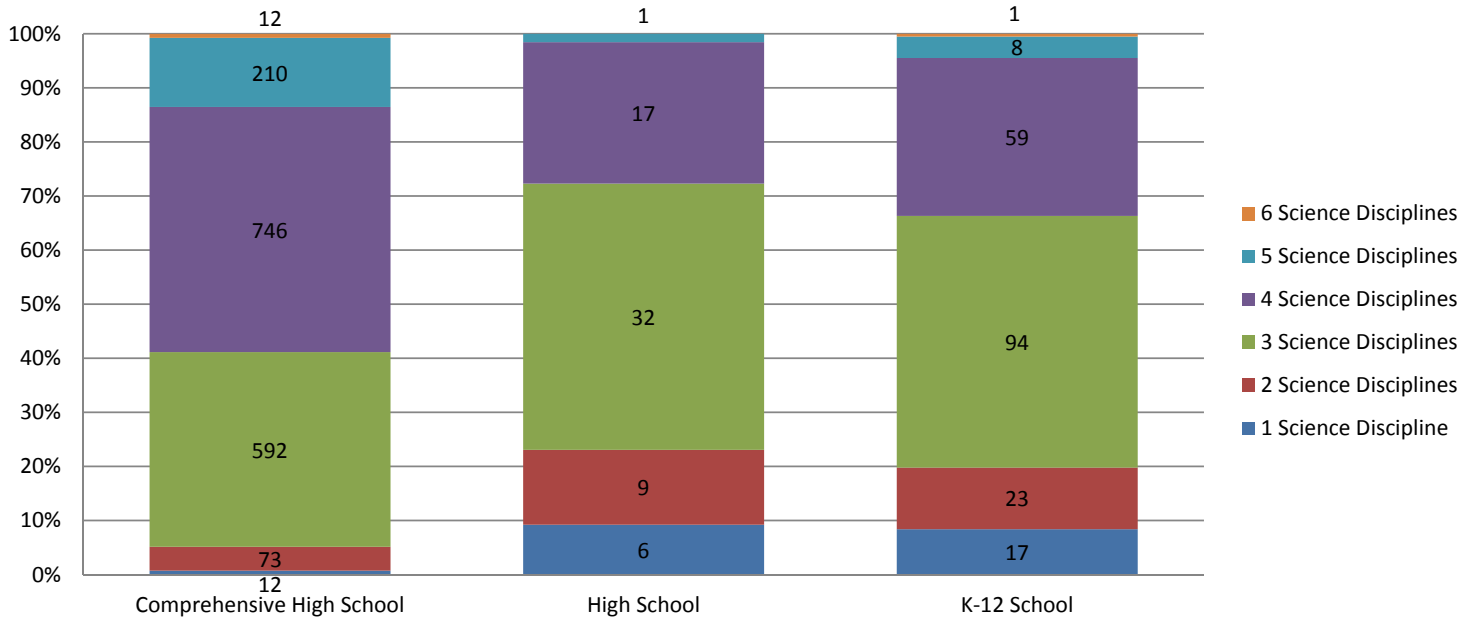
Number of Science Disciplines Offered by School Type 2015-2016



Number of Science Disciplines Offered by School Type 2016-2017

School Type	1 Science Discipline	2 Science Disciplines	3 Science Disciplines	4 Science Disciplines	5 Science Disciplines	6 Science Disciplines	Total
Comprehensive High School	12	73	592	746	210	12	1645
High School	6	9	32	17	1		65
K-12 School	17	23	94	59	8	1	202
Total	35	105	718	822	219	13	1912

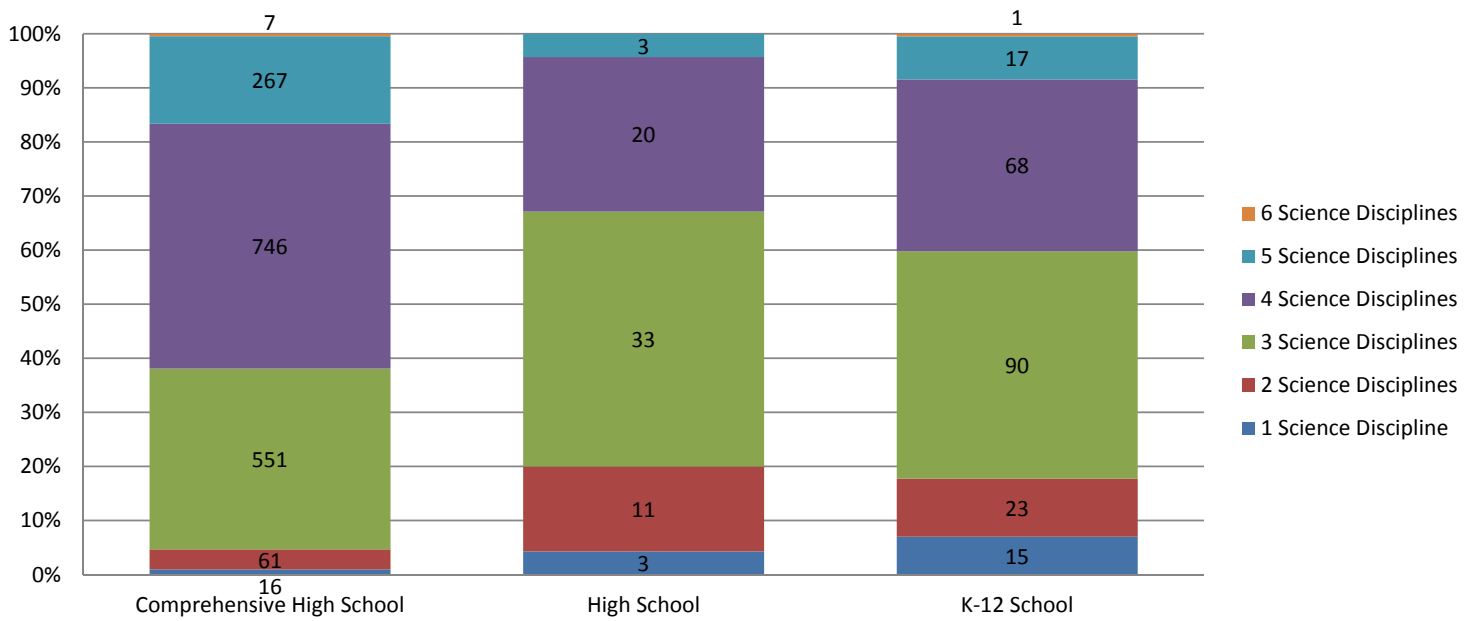
Number of Science Disciplines Offered by School Type 2016-2017



Number of Science Disciplines Offered by School Type 2017-2018

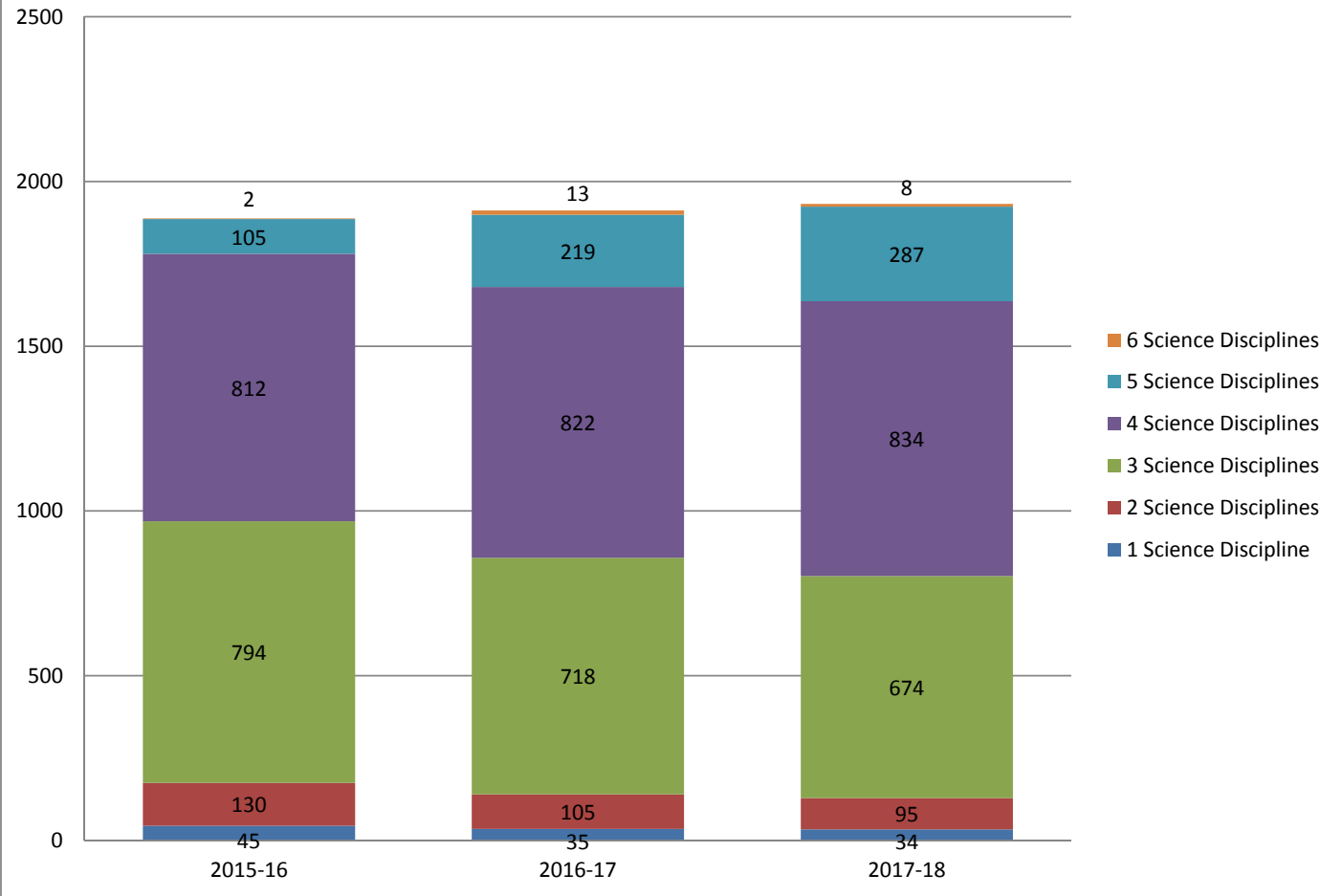
School Type	1 Science Discipline	2 Science Disciplines	3 Science Disciplines	4 Science Disciplines	5 Science Disciplines	6 Science Disciplines	Total
Comprehensive High School	16	61	551	746	267	7	1648
High School	3	11	33	20	3		70
K-12 School	15	23	90	68	17	1	214
Total	34	95	674	834	287	8	1932

**Number of Science Disciplines Offered by School Type
2017-2018**



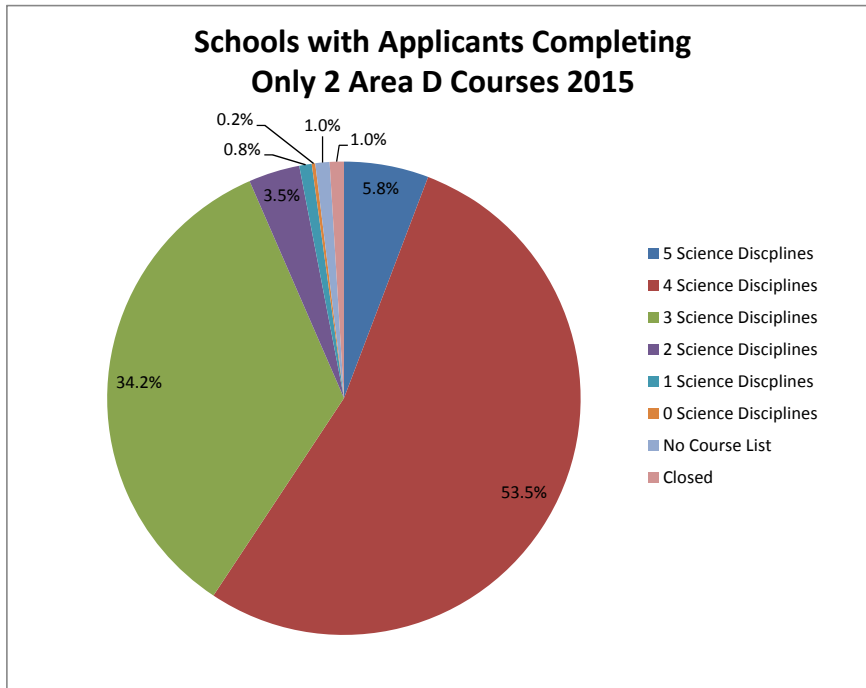
Appendix C

Number of Science Disciplines Offered Comprehensive High School, High School, K-12 School



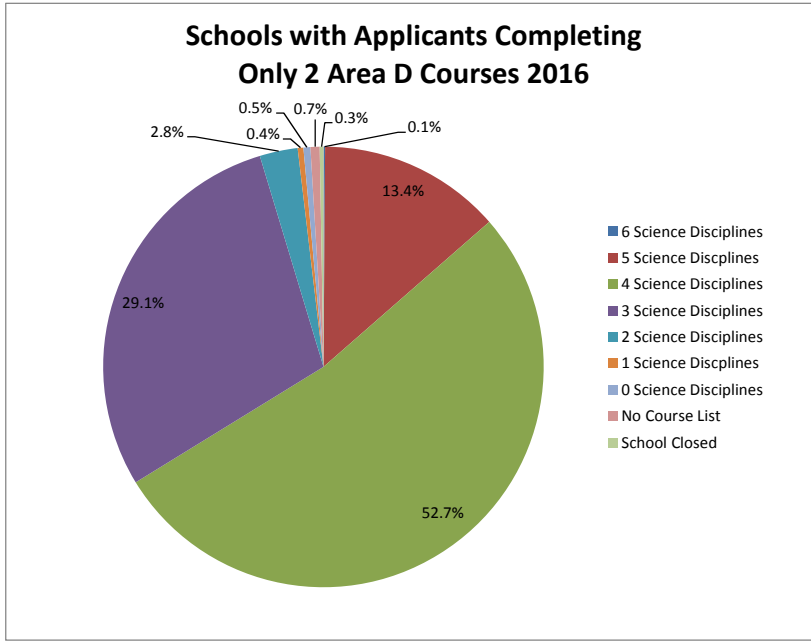
Schools with Applicants Completing Only 2 Area D Courses 2015

School Type	5 Science Disciplines	4 Science Disciplines	3 Science Disciplines	2 Science Disciplines	1 Science Disciplines	0 Science Disciplines	No Course List	School Closed	Total
Comprehensive High School	46	429	252	22	3	1		5	758
High School		2	6						8
K-12 School	2	5	13	2	2			2	26
Alternative High School of Choice		7	8	5	2	1	1	1	25
Other			4						4
Unknown							7		7
TOTAL	48	443	283	29	7	2	8	8	828



Schools with Applicants Completing Only 2 Area D Courses 2016

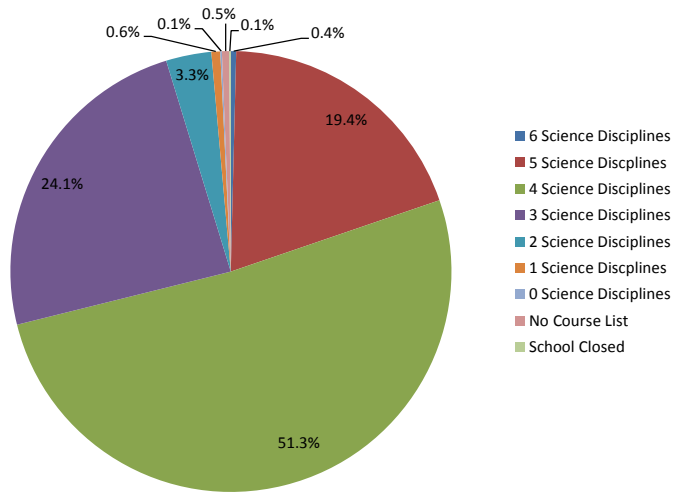
School Type	6 Science Disciplines	5 Science Disciplines	4 Science Disciplines	3 Science Disciplines	2 Science Disciplines	1 Science Disciplines	0 Science Disciplines	No Course List	School Closed	Total
Comprehensive High School		98	389	188	18		1		2	696
High School			2	3				1		6
K-12 School		1	3	13	1	1				19
Alternative High School of Choice	1	2	2	12	2	2	3			24
Other				3						3
Unknown								4		4
TOTAL	1	101	396	219	21	3	4	5	2	752



Schools with Applicants Completing Only 2 Area D Courses 2017

School Type	6 Science Disciplines	5 Science Disciplines	4 Science Disciplines	3 Science Disciplines	2 Science Disciplines	1 Science Disciplines	0 Science Disciplines	No Course List	School Closed	Total
Comprehensive High School	3	145	389	169	17	2				725
Continuation High School				1	1					2
High School		2	2	2	1					7
K-12 School		2	5	9	3	1			1	21
Alternative High School of Choice		2	2	5	3	1	1			14
Special Education / State Special School						1				1
Other			2	2	1					5
Unknown								4		4
TOTAL	3	151	400	188	26	5	1	4	1	779

Schools with Applicants Completing Only 2 Area D Courses 2017





**California
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January 22, 2018

Henry Sánchez

Chair, Board of Admissions and Relations with Schools (BOARS)

University of California

Via Email Only: Henry.Sanchez@ucsf.edu

RE: Support for Proposed Revisions to Senate Regulation 424.A.3 (Area D)

Dear Dr. Sánchez:

The California Science Teachers Association (CSTA) supports the proposed revisions to University of California Senate Regulation 424.A.3 (Area D) and urges the Academic Council to approve the recommended changes. CSTA is a 501(c)(3), professional, membership association with more than 3,000 members. CSTA has played a leadership role in the development, adoption, and subsequent implementation of the California Next Generation Science Standards (CA NGSS) since their conception. CSTA provided feedback during the development of the standards, and has informed and participated in one capacity or another in all aspects of their implementation including assessment, accountability, curriculum framework development, teacher preparation and credentialing. The alignment of the UC's area "d" subject requirement with the CA NGSS is a critical component to successful implementation in high school and we therefore fully support the proposed revisions.

The proposed changes would bring UC's admission requirements for science into alignment with the newly adopted California K-12 science standards and communicate that the UC system supports the shift to the CA NGSS. The changes proposed support all high school course models in the *California Science Framework* as well as high school course sequences that may be developed locally. Additionally, raising the requirement from two years to three is consistent with actions recently taken by the California State Board of Education. When California adopted CA NGSS and appendices, the state adopted a set of high school standards that necessitate three years of science to achieve. In 2017, the California State Board of Education adopted the *California Science Framework* which offers three possible high school course models, all requiring three or four years to actualize. The changing of the name of the area "d" subject requirement from "Laboratory Science" to "Science" is also consistent with CA NGSS. The change in the name covers the broader range of CA NGSS-aligned fields and provides greater clarity to course designers seeking area "d" approval for their courses. The proposed changes also eliminate alignment with the 1998 California Science Standards, a move



CALIFORNIA'S ADVOCATE FOR HIGH QUALITY SCIENCE EDUCATION

CSTA sees as critical in communicating with high school course designers and educators that UC supports K-12 implementation of CA NGSS.

High schools face many challenges in developing their science course models. They need to help students meet the UC admission requirements, they want to support existing AP and IB programs, many have developed outstanding career pathway programs in STEM fields, and they want courses that are meaningful to the local context and student populations. As mentioned above, California has offered three example course models for high schools to consider. Additionally, the CA NGSS Appendix K: Model Course Mapping in Middle and High School for the Next Generation Science Standards offers guidance to high schools that may choose develop their own course models, including accelerated course pathways (one such model has already been published by Achieve, Inc.) and Career Technical Education (CTE) pathways that integrate CA NGSS. The proposed changes are supportive of the many course models that exist and will be developed by high schools. These models will be based in their local context and designed to best meet the needs of their students. By “opening up” the third year of required science to courses such as engineering, computer science, applied sciences, earth/space science, and more, while maintaining course requirements that are rigorous and aligned with CA NGSS, UC would not be placing an undue burden on schools and students. This is also consistent with CA NGSS's broadening of science standards to include engineering, technology, and computational thinking. This third year allows for more flexibility for students and schools in course decision-making. This flexibility would support schools in modifying and/or designing and developing their courses and course sequences that would meet the revised course requirements. In rural and hard-to-staff schools, the options outlined in the course requirements allow for schools and districts to consider teaching faculty credentials and experience when designing courses to meet both student educational needs as well as area “d” course requirements.

Increasing the amount and quality of science education for all students improves their scientific literacy and helps to prepare them not only for college and career, but also as educated, informed voters and citizens. Careers in Science, Technology, Engineering, and Math (STEM) are some of the fastest growing and best paying that require highly skilled and literate workers now and in the future. Increasing the science requirement helps insure that California students have access to good careers and California employers have the skilled workers needed to keep in the lead of the worldwide economy. CSTA has a long-standing policy of supporting a three-year science high school graduation requirement. California lags behind other states in graduation requirements for students in science. According to a data [recently released by the Public Policy](#)

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[Institute of California](#) (PPIC), 42 states currently require three years of science in order to graduate. Currently, UC's admission requirements exceed the state's requirements in both math and English, increasing the science requirement from two years to three is not without precedent, and is good policy. As many as four in ten districts currently have a three year high school science graduation requirement, and 51% of districts align their graduation requirements with UC course requirements. Increasing the requirement would likely have the impact of increasing graduation requirements in many districts across the state, a move that is critical in preparing all students for career and college in the 21st century.

CSTA urges you to support the revisions to the area "d" course requirements and increasing of the admission requirements for science from a "two years required, recommended three" to three years required. High schools look to the UC for leadership and direction and these changes would be important to support the successful implementation of the California Next Generation Science Standards.

Sincerely,

A handwritten signature in black ink that reads 'Jill Grace'.

Jill Grace
President

Appendix E

2016-2017 Science Course Enrollment In Grades 10-12

2016 -2017 Science Course Enrollment - 10th Grade

	Science Course Enrollment	Public School Enrollment	%
California Total	417,740	486,085	85.9%
Female	204,650	236,827	86.4%
Male	213,090	249,258	85.5%
African American	24,362	28,731	84.8%
American Indian	2,190	2,886	75.9%
Asian	40,251	43,757	92.0%
Filipino	12,753	14,037	90.9%
Hispanic	223,004	260,201	85.7%
Pacific Islander	2,046	2,436	84.0%
White	99,294	117,592	84.4%
Two or More Races	11,424	13,238	86.3%
English Learners	47,357	59,222	80.0%

2016 -2017 Science Course Enrollment - 11th Grade

	Science Course Enrollment	Public School Enrollment	%
California Total	364,359	481,521	75.7%
Female	180,372	234,673	76.9%
Male	183,987	246,848	74.5%
African American	20,590	28,696	71.8%
American Indian	1,795	2,889	62.1%
Asian	39,625	45,840	86.4%
Filipino	11,876	14,273	83.2%
Hispanic	188,878	252,458	74.8%
Pacific Islander	1,845	2,471	74.7%
White	88,150	119,308	73.9%
Two or More Races	9,718	12,810	75.9%
English Learners	35,642	53,556	66.6%

2016 -2017 Science Course Enrollment - 12th Grade

	Science Course Enrollment	Public School Enrollment	%
California Total	211,215	484,169	43.6%
Female	104,392	234,014	44.6%
Male	106,823	250,155	42.7%
African American	12,787	30,799	41.5%
American Indian	1,045	3,020	34.6%
Asian	25,611	43,001	59.6%
Filipino	7,221	14,469	49.9%
Hispanic	106,092	253,193	41.9%
Pacific Islander	1,111	2,571	43.2%
White	50,623	121,771	41.6%
Two or More Races	5,777	13,000	44.4%
English Learners	17,145	48,053	35.7%

Source: California Department of Education

Note: Public School Enrollment based on Census Day Counts