Humboldt State University
University Senate Meeting Minutes
16/17:01 09/06/2016

Tuesday, September 6, 2016, 3:00-5:00pm, Goodwin Forum (NHE 102)

Chair Julie Alderson called the meeting to order at 3:00pm on Tuesday, September 6, 2016 Goodwin Forum, Nelson Hall East, Room 102; a quorum was present.

Members Present
Abel, Alderson, Avitia, Blake, Camann, Creadon, Dunk, Enyedi, Eschker, Flynn, Frye, Guillen, Karadjova, Le, K. Malloy, N. Malloy, Meyer, Oliver, O'Neill, Ortega, Platt, Rizzardi, Rossbacher, Thobaben, Virnoche, Wilson, Wrenn

Members Absent
Lopes, N. Maguire, Pence

Guests
Richard Boone, Rock Braithwaite, Lisa Castellino, Ken Fulgham, Mary Glenn, Alex Hwu, Gay Hylton, Anna Kircher, Susan Marshall, Jodie Slack, Rick Zechman, Noah Zerbe

Announcement of Proxies
No proxies were assigned for the 9/6/16 meeting

Approval of and Adoption of Agenda
Agenda changed to add a discussion of Discontinuation of Probation for Rangeland Resources to follow the Open Forum for the Campus Community
M/S (Flynn/Ortega) to approve the altered agenda
Motion carried unanimously

Approval of Minutes from the May 10, 2016 Meeting
M/S (Flynn/Karadjova) to approve the Minutes of the May 10, 2016 meeting
Motion carried without dissent; one abstention

Welcome New Members:
Chair Alderson introduced and welcomed the following new Senators:

- Dale Oliver – Chair, Integrated Curriculum Committee
- Christian Guillen – Labor Council Delegate
- Mark Rizzardi – Tenure-line At-Large Instructional Faculty Delegate
- Justus Ortega – Tenure-line At-Large Instructional Faculty Delegate
- Mary Virnoche – Tenure-line CAHSS Instructional Faculty Delegate
- Jennifer Maguire – Tenure-line CPS Instructional Faculty Delegate
- Marissa O'Neill – Tenure-line Interim CPS Instructional Faculty Delegate

- Mike Le – Staff (Non-MPP) Delegate
- Jonah Platt – AS President
- Jessie Avitia – AS Delegate

Chair Alderson also introduced the newly appointed Dean of the College of Natural Resources and Sciences, Dr. Richard Boone.

Reports, Announcements and Communications of the Chair

Chair Alderson reported that an update on the May, 2016 Senate approved IP Policy as well as the probationary status on the Rangeland program will be discussed.

Reports of Standing Committees, Statewide Senators, and Ex-officio Members

Academic Policies:

- Written Report Attached

Academic Senate CSU Statewide Senate:

- Written Report Attached

Faculty Affairs:

- Written Report and Quantitative Reasoning Task Force Report Attached

University Resources and Planning:

- Written Report Attached

University Policies:

- Current committee members look forward to the AEC appointments of two faculty representatives to the UPC
- Upcoming committee work will involve the following:
    - Drafting a policy on policies
    - Reviewing the status of University committees
    - Reviewing any incoming policy proposals

Constitution and Bylaws:

- CBC met during the week of 8/29/16
- CBC has brought forward Senate Resolution 01-16/17-CBC – September 6, 2016 for a first reading
- CBC will consider the feedback gathered from Senate during the discussion of the timeline on approving resolutions

California Faculty Association:

- CFA Humboldt will hold a bargaining meeting on 9/28/16 for faculty to discuss ideas related to bargaining the next contract
- CFA requested a Meet and Confer with the CO to discuss details relating to the Canvas conversion

Labor Council:

- Biannual meeting with labor council representative will take place at 1:00pm on 9/9/16

Associated Students:

- AS hopes to have the third Student Delegate seat on Senate filled by the next Senate meeting on 9/20/16

Provost's Report:

Provost Enyedi provided updates and remarked on the following topics:

- Graduation Initiative 2025
- WASC and the Strategic Plan
- Transformation of the former Institutional Research and Planning to the new Office of Institutional Effectiveness
- Commitment to increasing Tenure-track density
- Upcoming Administrative searches taking place within Academic Affairs
- Re-Imagining the First Year (RFY)

President's Report:

President Rossbacher shared her determination to ensure that our students and their success are at the center of the business and planning that is taking place on campus; focus is being placed on connecting WASC with implementation of the Strategic Plan and the graduation initiative.

The President reports that an assessment of Athletics is being conducted. Representatives from Strategic Edge Athletics Consultants will be on campus to meet with groups and offer open forums for campus and community members. Thoughts and ideas may also be shared electronically using the Athletic Assessment comments link available through the President's home page or via the following link: http://www2.humboldt.edu/president/node/169

Athletic Director, Dan Collen, announced his retirement. The President's office will be launching a search for a new Athletic Director.

As part of the Chair's report and in response to questions pertaining to the Canvas contract,

Chair Alderson recognized Anna Kircher, Chief Information Officer, ITS.
Anna provided the attached, *Document Stack for Canvas Contract*, along with an update regarding the contractual negotiations taking place, the anticipated launch date, and the technical implementation that will take place to produce a production environment.

Student Affairs:
Vice President Blake reported on the following:

- Equity Alliance of the North Coast will be hosting an event at 2:00pm on Monday, 9/19 in KBR and another at 6:00pm that evening at the HCOE; both events will feature Julie Nelson, Dwayne Marsh, and Brenda Anibarro
- With new and returning students moved in, residence halls are 99% full
- A company specializing in housing master planning will be on campus hosting focus groups to address a plan for student homelessness
- Student enrollment dropped; a preliminary Fall 2016 enrollment dashboard is available on the Institutional Effectiveness webpage via the following link: http://www2.humboldt.edu/irp/

Consent Calendar from the Integrated Curriculum Committee (ICC)
The attached ICC Consent Calendar was approved.

It was noted that there were no guests signed-up to speak during the Open Forum for the Campus Community

TIME CERTAIN: 3:50 PM – Update on WASC and the Strategic Plan
M/S (Abell/Camann) to postpone the WASC presentation so that discussion items may be discussed

Chair Alderson expressed concern and warns about postponing a Time Certain that has been agreed upon and planned for by the guest presenters who are in attendance.

It was suggested that the WASC presentation could be limited to 20 minutes.

M/S (Abell/Dunk) to limit the Time Certain for the Update on WASC and the Strategic Plan to 20 minutes
Motion passed without dissent; one abstention

Rock Braithwaite, Mary Glenn, and Lisa Castellino provided an abbreviated update to Senate on WASC and the Strategic Plan. A document, *Steering/Self-Study Committee Recommendations for Strategic Plan Implementation,* was provided to Senators and is

attached. Additional information on the Strategic Plan and WASC can be found via the following link: https://strategicplan.humboldt.edu/content/wasc

Discussion Item: Discontinuation of Probation for Rangeland Resources

Provost Enyedi referenced the email exchange in which he responded and provided notification of his position regarding the recommendation made to him with the passing of Resolution 29-15/16-ICC.

Resolution 29-15/16-ICC was passed by Senate during the 4/26/16 Senate meeting. After the 5/10/16 approval of the minutes from the 4/26/16 Senate meeting, *Resolution 29-15/16-ICC – April 26, 2016* and an emergency item, *Resolution 28-15/16-APC – May 10, 2016*, were forwarded by the Senate office on 5/11/16 to the Provost for his consideration. The Provost responded on 5/12/16 with the following message:

From: Alex Enyedi [mailto:alex.enyedi@humboldt.edu]
Sent: Thursday, **May 12, 2016** 4:10 PM
To: Paula Petersen <Paula.Petersen@humboldt.edu>
Cc: Cindy Moyer <cm4@humboldt.edu>; Andrew Stubblefield <Andrew.Stubblefield@humboldt.edu>; Julia Alderson <julie.alderson@humboldt.edu>; Mary Hackett <Mary.Hackett@humboldt.edu>; Kay Libolt <Kay.Libolt@humboldt.edu>; Lura Holtkamp <Lura.Holtkamp@humboldt.edu>; Alexander Enyedi <alex.enyedi@humboldt.edu>
Subject: Re: Approved Senate Resolutions #29 and #28

Dear Paula,

I am writing to provide my approval of the Academic Honesty (Resolution on Revisions to Academic Honesty Policy (Resolution 28-15/16-APC).

With respect to the Resolution on Discontinuing Probationary Status of the Rangeland Resources/Wildland Soils Program, I am still evaluating the CNRS report on the program (as required by the MOU prepared in 2009-2010). However, I wish to acknowledge the passage of the resolution and thank the ICC for their good work preparing the recommendation to the Senate. Please let me know if you need any further feedback concerning this particular resolution.

Sincerely,
Alex

Dr. Alex Enyedi
Provost and Vice President of Academic Affairs
Humboldt State University

M/S (Abell/Karadjova) to introduce letters of support (attached) from Rangeland faculty and managers throughout the region
Motion passed unanimously

Discussion ensued regarding support that the program has received, effects due to its uncertainty and the need for an informed and timely decision.

With consideration given to the ICC's April, 2016 Resolution, the recommendation of Dean Smith, and the opinion of the new Dean of CNRS, Provost Enyedi stated that a decision would be made as soon as possible this academic year.

Resolution to Amend the Bylaws of the University Senate to Clarify Quorum Requirements for Standing and Ad Hoc Committees (01-16/17-CBC – September 6, 2016) First Reading
M/S (Abell/Meyer) to postpone the reading of resolution 01-16/17-CBC
Motion passed unanimously

Discussion Item: Process of Approving Resolutions
M/S (Abell/Wilson) to postpone the *Process of Approving Resolutions* discussion item
Motion passed unanimously

Discussion Item: Status of the Senate-recommended Policy on Intellectual Property
President Rossbacher reiterated the information that was relayed to the Senate office in reply to the Senate-recommended policy on Intellectual Property which was identified as an emergency item in May, 2016. At the direction of the CSU's Office of the General Council, she was given clear instruction that she could not sign the proposed policy as the CSU is in the process of drafting and enacting a consistent system-wide policy.

Discussion ensued regarding the timeline for a new system-wide policy and concerns for faculty operating without a current policy.

M/S (Abell/Camann) to introduce a *Sense of the Senate* resolution (attached) demanding Presidential approval of the new IP Policy
Motion passed

M/S (Eschker/Dunk) to extend the meeting by 10 minutes
Motion passed

Discussion ensued regarding the limbo status of a campus IP Policy and the whether there would be a possibility of approving the policy on an interim basis.

M/S (Avitia/Abell) to open the resolution for amendments
Motion passed

It was suggested that, based on how many campuses are operating without an IP Policy, that the resolution should be directed at the Chancellor instead of our President.

The President expressed her concern for faculty and is in favor of meeting to discuss ideas for

an interim solution.

M/S (K. Malloy/Camann) to extend the meeting by 10 minutes
Motion passed

M/S (Virnoche/Platt) called the question
Motion passed without dissent, 1 abstention

After amending the resolution to delete the language referring to “faculty session” Senators voted; Sense of the Senate Resolution Demanding President Rossbacher Approve the University Senate Recommended Intellectual Property Policy for Humboldt State University, **passed** without dissent.

Ayes: Thobaben, Abell, Dunk, Platt, Meyer, Virnoche, Creadon, Wilson, O’Neill, Eschker, Karadjova, Malloy, Avitia, Frye

Nays: Le, Oliver, K. Malloy

Abstentions: Blake, Enyedi, Wrenn, Flynn, Rizzardi

Meeting adjourned at 5:24pm

HUMBOLDT STATE UNIVERSITY
University Senate Written Reports – September 6, 2016
Standing Committees, Statewide Senators and Ex-officio Members

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Academic Policies Committee:

Submitted by Mary Virnoche, APC Chair

Members:
http://www2.humboldt.edu/senate/academic-policies-committee

Outcomes/Decisions

1. First meeting date:
   2-3 on Wednesday, September 7, 2016 in BSS 508. One current committee member is scheduled to teach during this time. We will attempt to juggle schedules to find a common time for all.

2. Three committee vacancies:
   associated student rep 1; associated student rep 2.

Pending Agenda Items

1. Early tenure:
   Collaborate with Faculty Affairs on Appendix J language and related information dissemination

2. Thesis embargo:
   policy/language: Resources: Justus Ortega & George Wrenn. Digital scholar could jeopardize publication.

3. Syllabus mention of ADA furniture:
   SDRC email request to Vice Provost.

4. Academic Policy changes that are needed to support strategic plan.

Faculty Affairs Committee:

The Committee held its first bi-weekly meeting on Wednesday, August 31 at 8 a.m. to set goals and priorities for the year. Meetings this semester are scheduled for: September 14, 28,

October 12, 26, November 9, 30 and December 14. Meetings are open to the campus community. We currently meet in Library 118.

Old and new business under review this fall includes:

Ongoing assessment of the teaching evaluation instrument;

Centralized administration of the teaching evaluation instrument;

Inclusion of lab evaluations in the teaching evaluation instrument;

EO 1096 complaint procedure as complement to CFA grievance process;

Faculty and lecturer I.P. rights within the Canvas LMS;

HSU and system-wide I.P. policy development and adoption;

Classroom and class scheduling processes;

Tenure-track faculty and lecturer involvement in shared governance;

Streamlining of the Assigned Time Award application process;

Gender equity in early promotion and options for addressing disparities;

Review of Faculty Service Award policy to allow alternatives to the lecture requirement;

Revisiting a Faculty Presence resolution initially drafted in 2012.

In our next meeting, we will continue to prioritize and begin to examine topics in depth.

The Faculty Affairs Committee addresses matters involving the individual or collective relationship of faculty to the University. The Committee can be reached though the Senate's Faculty Affairs web page: https://www2.humboldt.edu/senate/faculty-affairs-committee.

University Resources and Planning Committee:

The URPC held a ¾ day retreat on Friday, August 26. The Budget Office briefed the committee on the issues of enrollment revenue and cost per full time equivalent student (FTES). The 2016-17 CSU target for HSU is 7,603 resident FTES, whereas HSU's budgeted resident FTES target is 7,295, which is 308 resident FTES lower. (This compares to being under last year's resident FTES target of 7,483 by 66 with an actual FTES of 7,417.) HSU's 2016-17 revenue per a student is a combination of a state appropriation of $5,809 per FTES and student paid tuition revenue of approximately $5,600 per FTES. Consequently, **we are getting almost $1.8 million ($5809 x 308 FTES) more in CSU appropriations than what we would expect for our current enrollment**. This puts HSU in a vulnerable funding position and is a red flag for future budgets. Likewise, we are collecting almost $1.7million ($5,600 x 308 FTES) less in tuition revenue than if we had met the CSU enrollment target. Revenue from out-of-state students is tuition only. It is unclear why enrollment is down.

The budget office also provided data that demonstrated that HSU continues to stand out among the CSU campuses with respect to total expenditures per FTES, at $15,667. The other "small" CSU's have FTES costs of $13,547 (Bakersfield), $14,231 (San Marcos), $13,222 (Sonoma) and $14,486 (Stanislaus). Similarly, the CSU overall campus appropriation funding per FTES is high for HSU ($9,714 per FTES) with only the new campuses Channel Islands ($12,706) and Monterey ($12,081), in addition to Maritime ($20,944), getting more. (Fullerton has the lowest at $5,946 while most campuses were the in the $6,500 to $7,400 range.)

The "Integrated Assessment, Planning, and Budget Process" workgroup gave a presentation on a proposed framework of how budget units across the campus and the URPC could work together in establishing a thoughtful budget process linked to strategic planning and assessment. The URPC decided to accept its part within this framework to get the committee moving forward.

The URPC ended its retreat by accepting President Rossbacher's six goals stated for the committee for this year. The goals are (as copied from her letter to the URPC) : (1) Continuing implementation of strategic budgeting principles and defining strategic assets; (2) Recommending a balanced budget for 2017-18 that eliminates the University's structural deficit; (3) Beginning the planning process for 2017-18 using actual previous-year enrollment, not future-year targets; (4) Developing multi-year budget plans (at least for the two subsequent fiscal years); (5) Asking all divisions to develop two budget scenarios and describe the impact of a 5% increase in the budget and a 5% decrease in 2017-18, as a tool for understanding strategic priorities and planning and to prepare for the uncertainties of the next fiscal year; and (6) Completing and recommending formal policies for both operating reserves and the Capital Improvement Fund.

ASCSU Statewide Senator Report:

ASCSU representatives Mary Ann Creadon and Erick Eschker

The first meetings of the ASCSU take place during the week of September 12-16, so we have no current report. You've been provided with the ASCSU Quantitative Reasoning Task Force report, which was published on September 1. We will receive more contextual information about the report at the meetings, and we may vote on a resolution recommending a course of action with regard to the report.

Academic Senate of the California State University

Quantitative Reasoning Task Force

Final Report, September 1, 2016

Guiding Principle: Educational policy should balance access and opportunity to achieve equity.

Upon its acceptance by the Academic Senate of the California State University in September 2016, this report and its appendices will be posted under "Student Preparedness/Success" at calstate.edu/AcadSen/Records/Reports/index.shtml.

Contents

Executive summary

In its 2015–16 term the Academic Senate of the California State University (CSU) convened a Quantitative Reasoning Task Force to review the CSU's expectations for student proficiency in quantitative reasoning upon high school and college graduation, and to recommend changes to existing policies and practices. (See Appendix A, Academic Senate CSU Resolution 3230-15.)

The CSU's existing standards for statewide curricula in quantitative reasoning have been in place for many years, and this suggests they may lag behind current thinking and best practices in the field. But there is also evidence indicating that these dated policies may be acting as barriers to some students, particularly those from traditionally underserved populations and in the California Community Colleges.

The work of the Task Force was guided by the principle that *any educational policy enacted by the CSU must balance access and opportunity to achieve equity*. That is, genuine equity lies in providing students from all backgrounds with equitable prospects not only for admission and graduation (access), but also for meaningful degrees that prepare them for high-value careers after graduation (opportunity).

The Task Force included faculty and administration representing the CSU, the University of California, the California Community Colleges, the California Department of Education, employers, and the Office of the Lieutenant Governor. Its final recommendations were prepared by a subset of the Task Force holding offices in the Academic Senate CSU, and designated "drafting members." (See the Task Force membership given in Appendix B.)

Members of the Task Force conducted an extensive literature review, met with invited advisors, and participated in a national forum programmed by the U.S. Department of Education and hosted at the CSU Office of the Chancellor.

This report details the final recommendations of the Quantitative Reasoning Task Force, and they are summarized here.

Recommendation I: Formulate an updated quantitative reasoning definition based on CSU best practices and reflecting national standards.

Current policy relies on the phrase "intermediate algebra" as shorthand for full college preparation through high school, and defines baccalaureate-level quantitative reasoning as the math that builds on this level. The Task Force recommends updating this definition to include other kinds of quantitative reasoning.

Recommendation II: Revise CSU quantitative reasoning requirements and adopt equitable, feasible requirements that articulate with the other segments.

The Task Force found that CSU policies with respect to admission, transfer, and graduation are unduly constrained by treating foundational quantitative reasoning as necessary for success in all kinds of baccalaureate-level quantitative reasoning. Better policies would recognize that quantitative reasoning is valuable at both levels in ways that aren't always sequential. The Task Force proposes flexible and appropriately rigorous definitions of quantitative reasoning at the foundational and baccalaureate levels to inform separate requirements at entry and at graduation. The general expectation is that California's current State Standards in Mathematics, which follow closely the national Common Core Standards, will improve quantitative reasoning proficiency in students entering CSU, the University of California (UC) and the California Community

Colleges (CCC) system. It is the hope of the Task Force that in future most students will easily surpass the Foundational Quantitative Reasoning threshold.

Recommendation III: Ensure equitable access and opportunity to all CSU students.

The Task Force recommends policy revisions to provide equitable treatment of community college transfer and native CSU students; improve access to quantitative reasoning classes relevant to a student's major, interests and career; and raise the CSU system-wide expectation for quantitative reasoning in high school from three to four years of coursework.

In each of its recommendations, the Task Force has sought equity through a balance of access and opportunity. For example, the recommendation to raise the CSU's system-wide expectation of quantitative reasoning in high school to four years of coursework stipulates that the fourth year of instruction could reinforce practice and application of prior learning in quantitative reasoning rather than broach new topics in math. (In operational terms this means the fourth year of high school quantitative reasoning might not be in Area c of the UC a–g curriculum of college preparatory courses.)

Recommendation IV: Create a CSU "Center for Advancement of Instruction in Quantitative Reasoning"

The Task Force appreciates the rapidly changing contexts of high school instruction, best practices in postsecondary education, and the skills in quantitative reasoning that CSU students will rely on after graduation. This report supports a recent resolution of the Academic Senate of the CSU calling for creation of a dedicated Center, whose task it would be to implement these and subsequent findings and to support much-needed development of high-quality instruction and curricula in quantitative reasoning throughout the state's high school, community college and public university systems.

Although presented separately here, the four recommendations are interdependent. The policy proposals in Recommendation III depend on the definitions and distinctions of Recommendations I and II. The Center for Advancement of Instruction in Quantitative Reasoning (Recommendation IV) would provide a venue for the consultation and collaboration necessary for success in Recommendations I–III. Members of the Task Force expressed reservations about reducing the emphasis on algebra unless rigor could be assured in other ways. The Center, to be modeled on the CSU's successful Center for the Advancement of Reading, would provide the sustained system-level attention to pedagogy, evidence of learning at entry for both freshmen and transfer students, and support for high schools offering 12th grade courses in quantitative reasoning.

Introduction to CSU quantitative reasoning

Current policies.

Before admission. As part of the Early Assessment Program (EAP), California 11th grade students take the *California Assessment of Student Performance and Progress in English and Mathematics*, which provides an early indication of their readiness for college, while still allowing for time to schedule additional classes in the senior year if necessary. The Early Assessment Program (EAP) is a collaborative effort among the California State University, the California Department of Education, and the State Board of Education. Currently the program uses the *Smarter Balanced Summative Assessment* in mathematics to measure student proficiency.

Upon admission. Pursuant to Title 5 of the California Code of Regulations,[1] the CSU requires that all admitted students "possess basic competence in . . . mathematical computation to a degree reasonably expected of entering college students." Further, the CSU must promptly identify students who "cannot meet such competence" and require that they remediate any entry-level "deficiencies". To these ends, the CSU Chancellor issued Executive Order 665 [EO 1997] to establish the Entry-Level Mathematics (ELM) examination and a committee for its maintenance. EO 665 Addendum A articulates entry-level expectations:

> *The ELM examination tests for entry-level mathematics skills acquired through three years of rigorous college preparatory mathematics coursework (normally Algebra I, Algebra II, and Geometry).*

Addendum A also provides ELM test proxies (e.g., SAT, ACT, and Advanced Placement exam scores) for establishing basic competence. In the twenty years since the creation of the ELM test, there has been a decreased emphasis on second-year algebra and an increased focus on deeper mastery of the skills developed in Algebra I and Geometry, as evidenced in the list of topics on the ELM test published at ets.org/csu/about/elm/elm_topics. In 2002 developers revised the test to include more text-based and contextualized problems to assess quantitative reasoning in different situations and for different purposes. Of great concern to the Quantitative Reasoning Task Force is the fact that corresponding scores on the ELM test proxies (such as the SAT) were not adjusted to match the new ELM test content.

Summer before freshman year. The Early Assessment Program has been nationally recognized for raising high school students' awareness of their readiness, and contributing to increased enrollment in 12th grade math and English. But in its first decade of implementation, rates of student readiness at college entry remained flat, as documented by the proficiency reports at calstate.edu. In response the Trustees created the Early Start Program in 2010, subsequently codified in Executive Order 1048 [EO 2010], which states:

> [*I*]*ncoming freshmen who have not demonstrated proficiency in English and/or mathematics will be required to begin remediation prior to the term for which they have been admitted, e.g., summer prior to fall.*

Implementation was phased in over several years, with the final phase completed summer of 2014. As of this writing, a record share of the CSU's incoming freshmen are placed at college level, a success that the system attributes in part to the combined benefits of the Early Assessment Program and Early Start. A March 2015 report to the Board of Trustees states:

> *The Early Start program has successfully enhanced pre-existing campus and system efforts to improve the number of freshmen prepared for college-level mathematics and English when they begin their first term. In summer 2010, existing CSU programs improved proficiency in both English and mathematics by one percentage point resulting in 44 percent of the 2010 freshmen class starting their first term at the CSU college-ready in English and mathematics. Comparatively, summer 2014 Early Start courses improved proficiency in both English and mathematics by five percentage points resulting in 59 percent of the*

[1] See law.resource.org/pub/us/ccr/gov.ca.oal.title05.html.

> *entering freshmen class being prepared for college-level English and mathematics* [Smith and Sullivan 2015].

Prior to graduation. As part of the General Education Breadth Requirements, Title 5 specifies that all graduating CSU students must complete at least 12 semester units (or 18 quarter units) that

> [. . .]*include inquiry into the physical universe and its life forms, with some immediate participation in laboratory activity, and into mathematical concepts and quantitative reasoning and their applications* [Title 5 §40405.1].

CSU Executive Order 1100 mandates that courses in subarea B4 (mathematics/quantitative reasoning) of the GE breadth curriculum

> *shall have an explicit intermediate algebra prerequisite, and students shall develop skills and understanding beyond the level of intermediate algebra. Students will not just practice computational skills, but will be able to explain and apply basic mathematical concepts and will be able to solve problems through quantitative reasoning.*

To comply with Executive Order 1100 and to qualify for the B4 designation, a course should include an intermediate algebra prerequisite. However, a review of system-wide approved B4 courses suggests that practices supporting the CSU Area B4 graduation requirement — like the Entry-Level Math examination — have evolved away from reliance on intermediate algebra. The Task Force examined system-level data and used course titles to group courses and enrollments into four kinds of curriculum:

- Algebra Not Calculus: Courses that rely on some algebra concepts without explicitly preparing the student for eventual study of calculus. Business math is one example.
- Calculus and/or Algebra: Courses in traditional math sequences culminating in calculus or coming after calculus, and which are recommended preparation for the majority of STEM majors.
- Statistics: Courses that emphasize statistical reasoning and don't necessarily prepare students for calculus. These are prevalent in some social science majors, and in some newer cases may not carry an explicit prerequisite of intermediate algebra.
- Ideas in Quantitative Reasoning: Courses that emphasize quantitative reasoning for everyday life, and which are typically directed at non-STEM majors.

Fall 2013–2015	Number of courses	Number of enrollments
Algebra Not Calculus	17	18,963
Calculus and/or Algebra	111	143,012
Statistics	66	85,585
Ideas in Quantitative Reasoning	56	32,334

TABLE 1. Mathematics/quantitative reasoning in the CSU B4 courses (see also Appendix C).

CSU campuses had an opportunity to correct these categorizations, and around a third offered minor adjustments. Table 1 displays the results and shows that from fall 2013 to fall 2015, the CSU campuses offered a total of 250 courses that satisfied the Area B4 mathematics/quantitative reasoning requirement. Of these, 122 — or nearly half — have titles such as "Statistics" or "Ideas in Math", which suggest that students will not be expected to use intermediate algebra. Approximately 42% of the students who enter the CSU as freshmen take these non-algebra-intensive courses to meet their GE requirements. (However, some CSU campuses require students taking such classes to pass an intermediate algebra test prior to enrolling, possibly to comply with the above mentioned executive orders.)

Issues of inequity.

Inequity in access for developmental math CSU first-time freshmen. The intermediate algebra threshold does not reflect current CSU practice for entering freshmen. CSU freshmen may be deemed ready for B4 courses if they get a scaled score of 50 or better on the ELM exam. As the ELM exam tests for proficiency in Algebra I and some Geometry but very little Algebra II (generally understood to be synonymous with "intermediate algebra"), students who enter the CSU as "proficient" as measured by the ELM exam are not necessarily proficient in intermediate algebra.

Those who enter the CSU as "not proficient" as measured by the ELM exam are required to complete developmental math work within their first year. This coursework may or may not be held to the intermediate algebra standard (rather than the ELM exam standard) depending on which CSU campus the student attends. This variability can result in disparities of standards as applied to "proficient at entry" students versus those deemed "not proficient at entry".

Since EO 665 prescribes that "not proficient at entry" students must complete developmental math coursework in a timely way or risk being "stopped out" from the CSU system, this disparity raises legitimate equity concerns.

Inequity in access for transfer students. In order to gain transfer admission to the CSU, community college students must provide evidence of satisfactory completion of an approved quantitative reasoning course with an explicit intermediate algebra prerequisite. Community college students have historically been placed into or out of college-level math by a variety of placement tests (depending on the campus), whose purpose is to determine whether students are proficient in intermediate algebra. (The placement methods within the California Community College System are currently under revision and new placement tools using multiple measures are being implemented system-wide. The Task Force took the currently available details on these tools into account while making their recommendations.)

Community college students are thus held to a stricter standard of math proficiency than are entering CSU freshmen. The placement process results in up to 85% of the student population taking sequences of developmental math courses. It is well documented that such course sequences — which may span as many as 3–4 courses — result in very few students ever completing a college-level math class. In fact, students who place into the lowest level of developmental math have only a 1-in-10 chance of ever doing so. (For an account of current placement policies, see [Burdman 2015].) This raises a second equity concern.

Each year, member institutions of the California Community Colleges (CCC) system submit more than 1000 course outlines to the CSU for recognition in the GE Breadth

and in the Intersegmental General Education Transfer Curriculum (IGETC) transfer patterns. Courses proposed for quantitative reasoning must demonstrate both an explicit intermediate algebra prerequisite and evidence that the course will build on algebra proficiency. (California's articulation records are stored online in the ASSIST database and can be accessed at info.assist.org.)

A query of community college courses currently approved for transfer credit in Area B4 Quantitative Reasoning returned records for 1,616 separate courses. As it did with the B4 courses offered on CSU campuses, the Task Force grouped community college courses into four kinds of curriculum, and then invited the colleges to make any corrections. Nearly a quarter of the state's 113 community colleges replied, some with minor corrections and others to say the groupings were accurate as proposed.

The results in Table 2 indicate that transferable college-level quantitative reasoning classes in the community college system are less varied than those in the CSU. Approximately a quarter of the courses offered in community colleges are in "statistics" or "ideas in quantitative reasoning", compared to around half in the CSU. Although this finding doesn't take community college enrollment into account, it suggests that community colleges apply CSU Executive Order 1100 more literally than do CSU campuses. Since most graduates of the CSU initially enroll as transfer students, and since transfer students are a vital source of diversity and access to the baccalaureate, it follows that these differences in expectations and practices undermine the principle of equitable access to the CSU.

Inequity in opportunity for developmental math students. In response to the equity challenges above, some members of the California Community Colleges and a few CSU campuses have been piloting statistics pathways for students in non-math intensive majors. Under temporary approvals from the CSU General Education Advisory Committee (GEAC), these pathways counted for lower division CSU quantitative reasoning credit. At its meeting of September 2015, the GEAC heard reports of improved passage rates for students in the statistics pathways, both in GE quantitative reasoning courses and in some cases in subsequent lower division GE coursework that relies on quantitative reasoning (see [GEAC 2015] for the meeting minutes). These pathways also significantly narrowed or closed racial equity gaps in completion of baccalaureate-level quantitative reasoning courses. Such studies suggest that a pathways approach is a potential solution to the inequities of access mentioned above.

However, the GEAC and several faculty organizations have raised concerns about the effect of such pathways on the flip side of equity: opportunity. The absence of specific algebra requirements in these pathway programs raised concerns on the part of the CSU Council of Math Chairs and the GEAC about a possible erosion of the value

	Number of courses
Algebra Not Calculus	149
Calculus and/or Algebra	999
Statistics	272
Ideas in Quantitative Reasoning	196

TABLE 2. Mathematics/quantitative reasoning in the CCC's B4 courses. (See Appendix C.)

of a CSU bachelor's degree. The promising early evidence of success was considered noteworthy but on its own not definitive, and prompted the creation of this Task Force. Worries about the erosion of the degree tended to take two forms:

1. At a general level, CSU faculty expressed flexibility about moving away from the intermediate algebra threshold but wished to do so in a way that ensured that future students are prepared to apply quantitative reasoning skills as educated and responsible lifelong learners in fields such as personal finance (e.g., compound interest rates); in topics found in general education classes such as environmental science or geology; or in the science, technology, engineering, and math (STEM) courses taken by a broad range of majors.

2. A second, more specific concern was that a revised threshold could result in channeling students from underserved communities into careers that are less lucrative and less secure. This concern arises from the conscious design of statistics pathways, intended as they are for students placed into remediation who plan to major in non-algebra intensive fields. A statistics pathway is not appropriate for students in STEM or business programs since it doesn't prepare students for careers in these fields, and most Task Force members were comfortable with this level of tracking students.

However, there was pointed concern that the level of quantitative reasoning preparation in the temporarily approved statistics pathways curricula could leave students unprepared for even non-algebra-intensive careers that require some algebra proficiency. For example, nursing programs that require physics would call for more algebra than a statistics pathway would provide. The Task Force also heard concerns from experts in math education about the appropriateness of statistics pathways for elementary school teachers. Since teaching and nursing are two common careers that provide an entrée into the middle class, many Task Force members felt that these concerns should be weighed carefully against the opportunity that statistics pathways offer for access to a baccalaureate degree for students in other programs.

All agreed that if students are to make meaningful choices among math pathways, they must be properly advised regarding career exploration opportunities, and have access to curricular maps and meta-major groupings to ensure that their choices reflect their own aspirations rather than an avoidance of mathematics.

The Task Force did not reach complete agreement on the merit of arguments for and against these specific concerns. However, it did acknowledge the importance of analyzing the equity implications of its recommendations, and it supported the premise that genuine equity demands both *access* to the baccalaureate and conservation of the degree's essential value for the *opportunities* it confers to recipients.

Inequitable outcomes in CSU baccalaureate-level courses in quantitative reasoning. The CSU Office of the Chancellor provided the Task Force with detailed enrollment data from the fall 2013 term through fall 2015, including pass rates for each of the courses tabulated in Table 1. Student outcomes were disaggregated by ethnic and racial groups following national practice: African-American, Latino, and American Indian students are grouped together as so-called under-represented minority (URM) populations, while all other students are grouped separately, sometimes called non-URM, as a way of identifying inequitable outcomes. The findings (see Table 3) are consistent with national research, indicating passage rates for students from under-represented minority groups lag behind those of non-URM students (the achievement gap) and that this gap is

	Pass Rates by Population		
	Latinos, African-Americans, American Indians	Other	Difference
Algebra Not Calculus	70.77%	81.27%	10.50 pts
Calculus and/or Algebra	67.21%	76.89%	9.67 pts
Statistics	75.26%	84.74%	9.48 pts
Ideas in Quantitative Reasoning	79.94%	87.13%	7.20 pts

TABLE 3. CSU student outcomes in B4 courses, F13 through F15. (See Appendix C.)

larger in algebra-intensive courses than it is in quantitative reasoning courses that are not algebra intensive.

Goal of the Quantitative Reasoning Task Force. The Task Force sought to address the inequities it identified in both access and opportunity, while creating an up-to-date, transparent set of published criteria within which all public education systems (i.e., the range of institutions spanning high schools, community colleges, the California State University and the University of California) can innovate.

To attend to equity issues related to *opportunity*, the Task Force took the view that quantitative reasoning is more than just a single course taken to satisfy a general education requirement. It is the sum total of quantitative work necessary to support a student's major, interests, career and civic responsibilities.

Out of concern for equity issues related to *access*, the Task Force was careful to propose only those standards justified by their demonstrable value for learning. We also recognized that any evolving standard must integrate well with the curricula of our sister institutions, and so borrowed liberally from the high school segment as we drafted our recommendations, using the California State Standards language. Our recommendations were also informed by innovations in quantitative reasoning education in community colleges in California and nationwide.

Crucially, the Task Force recommends that the CSU shift from defining quantitative reasoning via prerequisites to a strategy of a clearly defining quantitative reasoning goals for both entering and graduating students. Such a paradigm leaves the responsibility of demonstrating that these goals are met to the different campuses and systems in collaboration with one another. This is a new focus of shared responsibility and brings us face-to-face with a range of new concerns, detailed in the rationales and implementation notes for the recommendations below. This collaboration between the systems to define quantitative reasoning will continue to develop as the national discussion on this topic evolves.

Quantitative Reasoning Task Force recommendations

Recommendation I: Define quantitative reasoning. The Task Force proposes this general definition for quantitative reasoning:

The ability to reason quantitatively is a stable combination of skills and practices involving:

(i) the ability to read, comprehend, interpret, and communicate quantitative information in various contexts in a variety of formats;
(ii) the ability to reason with and make inferences from quantitative information in order to solve problems arising in personal, civic, and professional contexts;
(iii) the ability to use quantitative methods to assess the reasonableness of proposed solutions to quantitative problems; and
(iv) the ability to recognize the limits of quantitative methods.

Quantitative reasoning depends on the methods of computation, logic, mathematics, and statistics.

Rationale for Recommendation I. The CSU does not currently have a definition of quantitative reasoning to guide planning and practice. This definition involves three important concepts: reasoning quantitatively, demonstrating general quantitative reasoning ability, and preparation for ongoing development of quantitative reasoning abilities. It is based on, though it differs from, those found in [MAA 1994, Dwyer et al. 2003, AACU 2013, Roohr et al. 2014].

The next section applies this definition to the different contexts in which students shall be required to demonstrate their ability to reason quantitatively.

Recommendation II: Revise quantitative reasoning requirements. Assessing the ability of students to reason quantitatively depends on their educational context. The quantitative reasoning definition proposed in Recommendation I is intended to inform revised policy that (1) evaluates the general quantitative reasoning ability of students entering and graduating from the CSU, (2) articulates well with the CSU's sister segments (California public high schools, California Community Colleges, and the University of California), and (3) specifies clearly stated and achievable procedures for evaluating and improving general quantitative reasoning ability.

Such requirements must acknowledge that the world is changing and mathematics is changing along with it. The National Academies Report *Mathematical Sciences in 2025* [NAR 2016] made it clear that mathematics is broader than arithmetic, algebra, and calculus at the service of research mathematics, engineering and science:

> *The ongoing trend for the mathematical sciences to play an essential role in the physical and biological sciences, engineering, medicine, economics, finance, and social science has expanded dramatically. The mathematical sciences have become integral to many emerging industries, and the increasing technological sophistication of our armed forces has made the mathematical sciences central to national defense. A striking feature of this expansion in the uses of the mathematical sciences has been a parallel expansion in the kinds of mathematical science ideas that are being used* [NAR 2016].

The current debate among mathematicians and the general public is whether a common quantitative reasoning set of skills and practices exists, and if so whether algebra has any part of it. Math requirements that prescribe intermediate algebra for everyone at

the foundational level or college algebra for everyone at the college level have been described as "the single-file death march that leads towards calculus" [Holm 2015]. Nationally they are being replaced by pathways that are tailored to a student's major or career.

At the same time, algebra has also been called a "civil right" by Robert P. Moses. Similarly, Linda Rosen, CEO of Change the Equation, has stressed the importance of algebra in the workplace [Rosen 2012]:

> *Corporate America understands that on-the-job-training will always be needed. Cutting-edge products and ideas inevitably require employees to learn new things. But, corporate America understandably balks at on-the-job-training that covers content that should have been learned — like algebra — before joining the workforce.*
>
> *Let's not throw the baby out with the bathwater. Instead, let's ensure that all students master algebraic thinking and problem-solving, the essence of algebra, regardless of their eventual career goals.*

These remarks speak to a more practical view of the role of algebra in a student's development, and it supports the defense of algebra as part of a liberal arts education brought by Nicholas Warner (Professor of Physics, Mathematics and Astronomy, University of Southern California) [Warner 2012]:

> *One of the less obvious goals in algebra is to get people to think more abstractly. Very elementary mathematics is all about "real things" and initially employs realia to help us add, subtract and multiply. From this experience we learn the language and some of the basic rules of mathematics. We abstract and generalize the experience and learn that, when we manipulate one side of an equals sign then the equality is only true if we do the same thing to the other side. Algebra makes a major intellectual leap: It names and labels things that we do not immediately know and that sometimes lie outside our direct experience. There are certainly other studies that involve abstractions like love, empathy and ethics, but in algebra we learn to handle abstractions that are not part of visceral human experience. We learn not only to be comfortable with such external unknowns but how to master them.*

Such strong and seemingly divergent views of algebra's role in quantitative reasoning point to the urgency of the task to reconsider quantitative reasoning requirements and the role of algebra in them. They suggest moreover the need for a more subtle analysis of which quantitative skills and practices are truly necessary for a given purpose.

In making that evaluation, the Quantitative Reasoning Task Force referred back to its guiding principle: the need to balance access and opportunity to achieve equity. Each time a mandatory skill is added to the "baseline," we risk excluding students from the academy, and yet each time one is removed, we risk limiting the value of the degree pursued. The task is to define which quantitative skills practices give enough value that they are worth the risk of limiting access, and this must be done in a dynamic and changing world.

The Quantitative Reasoning Task Force sought to establish a reasonable quantitative reasoning foundation on which additional specialized quantitative skills and practices could be built in the context of a student's interests, major, and intended career. The Task Force started with a logistical recommendation to separate the entry and exit level of quantitative reasoning.

Recommendation IIA: Separate foundational and baccalaureate quantitative reasoning requirements. The Task Force recommends ending the use of prerequisite language to impose a de facto foundational quantitative reasoning requirement. Instead it recommends defining separate foundational and baccalaureate requirements that are reasonable and equitable.

Rationale for Recommendation IIA. The Quantitative Reasoning Task Force used the definition of quantitative reasoning in Recommendation I to guide its recommendations for quantitative reasoning policy. In doing so, the Task Force identified two weaknesses of the current CSU quantitative reasoning policies:

(1) Current policy relies on "intermediate algebra as an explicit prerequisite" as the main identifier of a course that meets the B4 requirement. To move beyond this definition a well-articulated quantitative reasoning requirement is needed to provide a reasonable level of consistency between different CSU campuses, while maintaining principles of academic freedom.
(2) Serious inconsistencies exist between the quantitative reasoning requirements of native CSU freshmen and those of transfer students from community colleges. The inconsistencies may disproportionately and negatively impact historically underserved populations.

This rationale describes how the Task Force's efforts to developed a well-articulated, equitable quantitative reasoning requirement led to the proposed separation of the entry and exit requirements for quantitative reasoning.

As stated in the codified expectation section, current policy requires that any B4 (mathematics/quantitative reasoning) course transferable to the CSU or UC "have intermediate algebra as a prerequisite." Note: for the sake of concision, we use the term "quantitative reasoning" hereafter as shorthand for "mathematics/quantitative reasoning". In doing so, we intend no devaluation of the role of mathematics in quantitative reasoning.

This statement is natural for a quantitative reasoning course taken by a student majoring in STEM (Science, Technology, Engineering and Mathematics) for whom the calculus pathway is mandatory. However, it does not make sense for the majority of students in the CSU who are taking statistics or quantitative reasoning courses to satisfy their general education requirement in quantitative reasoning. (See Table 1.) Such courses have greatly expanded in enrollment and content over the last 20 years, and the curriculum tends to be less algebraically intensive but in many respects significantly more conceptually challenging than intermediate or college algebra.

The Task Force members acknowledge that in the same 20 years the intermediate algebra threshold has served a secondary purpose as the de facto standard of "foundational quantitative reasoning proficiency." This standard has offered a shared base on which baccalaureate quantitative reasoning courses, as well as other general education courses, can be built. Removing that criterion or changing it may have serious consequences for students and programs. Many general education courses assume the content of intermediate algebra or the "mathematical maturity" that proficiency in intermediate algebra implies. Thus, changing the status quo must be done with care. We note, moreover, that the growth in statistics and quantitative "life skills" in general education courses appears to have been encouraged by reliance on the de facto standard because CSU faculty have felt confident that students completing a general education quantitative reasoning course will possess demonstrated proficiency not only

in the skills of that particular course but also in the more general skills of the informal foundational threshold.

It is interesting to note that in [Roohr et al. 2014] the authors' proposed framework for assessing quantitative literacy in higher education is based on math content similar to the ELM. This suggests that deepening, extending, and contextualizing these skills is at the heart of college-level quantitative reasoning. This does not presuppose that students have mastery of these skills prior to college or should be denied access to college based on this list of skills, but rather that these skills should grow and deepen over time.

The Quantitative Reasoning Task force researched national best practices, interviewed colleagues from STEM and non-STEM fields, and listened to presentations from policy makers and experts in the field, including:

- Ted Mitchell, Under Secretary, U.S. Department of Education
- Catherine Lhamon, Assistant Secretary, Office for Civil Rights, U.S. Department of Education
- Philip Daro, mathematics educator and coauthor of the national Common Core Standards for Mathematics
- Bill McCallum, University of Arizona math professor and coauthor of the national Common Core Standards for Mathematics
- Robert Green, UCLA Math professor and founding member of Transforming Post Secondary Education in Math
- Tristan Denley, Vice Chancellor for Academic Affairs, Tennessee Board of Regents
- Estela Bensimon, USC Higher Education Professor & Founder of The Center for Urban Education
- Christopher Edley, Berkeley Law professor and President of The Opportunity Institute

The Task Force concluded that because the current quantitative reasoning GE requirement defines a quantitative reasoning course as one with "intermediate algebra as an explicit prerequisite", it involves misuse of the word "prerequisite" and a misrepresentation of current practice within the CSU, and does not even reflect current best practices for undergraduate curriculum in mathematics and quantitative reasoning.[2]

The Task Force believes that separating foundational and baccalaureate quantitative reasoning benchmarks will create a more constructive environment within which requirements for both levels can be discussed. This separation allowed the Task Force to develop consensus definitions of quantitative reasoning requirements that balance access and opportunity.

Recommendation IIB proposes a definition of quantitative reasoning for the baccalaureate level, while Recommendation IIC proposes a definition of the foundational quantitative reasoning the CSU would expect of all students at entry.

Recommendation IIB: Define baccalaureate quantitative reasoning. To earn a baccalaureate degree from the California State University, students shall:

[2] *De facto* as reflected in the various GE curricula used across the CSU system. Campus implementation of the current CSU quantitative reasoning requirement for graduation conforms to many of the suggested best practices for undergraduate students pursuing baccalaureate degrees in the U.S. As GE curricula vary across the 23 campuses within the CSU, the quantitative reasoning graduation requirements are implemented differently on different campuses.

(i) develop and demonstrate a proficient and fluent ability to reason quantitatively in a broad spectrum of the contexts defined by California State Standards for High School;
(ii) develop and demonstrate a general understanding of how practitioners and scholars solve problems quantitatively in a range of disciplines;
(iii) develop and demonstrate an in-depth understanding of how practitioners and scholars solve problems quantitatively in a specialized area (e.g., the major); and
(iv) be prepared to develop their ability to reason quantitatively after graduation in the various contexts defined by personal, civic, and professional responsibilities.

Rationale for Recommendation IIB. This definition reflects the existing good practice within the CSU in which students take quantitative reasoning B4 courses appropriate to their majors, general education interests, and careers. It also acknowledges that students develop quantitative reasoning outside of their B4 courses. Students have always reasoned quantitatively in general education classes in science, business, or technology, and are increasingly asked to do so as part of critical thinking on issues of equity, sustainability, and politics.

Recommendation IIB encourages system-wide conformity in the expected quantitative reasoning ability of students graduating from the CSU without infringing on academic freedom or being so prescriptive as to stifle the distinct campus cultures that thrive in the CSU. It is framed in the language of the California State Standards and thus articulates well with our sister segments (California high schools, California Community Colleges, and the University of California). Finally, it specifies a clearly enunciated framework within which procedures for evaluating and improving general quantitative reasoning can be assessed.

Notes on implementing Recommendation IIB. The above requirement shall be managed through the existing processes that determine whether courses meet general education requirements. The B4 courses would provide the backbone of the quantitative reasoning skills while other general education classes that require quantitative reasoning (e.g., science) would deepen and broaden the student's practice. The Task Force noted that the Western Association of Schools and Colleges (WASC) has asked for upper division critical thinking or quantitative reasoning measures and Recommendation IIB lends itself to such development.

Within the CSU, courses that deepen or broaden students' quantitative reasoning significantly beyond that of the California State Standards for high school shall be deemed college-level. For example, the typical course in statistics would be college-level whereas an intermediate algebra course would not be, since the content of intermediate algebra is completely contained within the California State Standards. Moreover, a course in statistics would qualify not only as college-level, but also as a B4 course.

In contrast, a history class may use quantitative reasoning at the college level; however, it will be unlikely to develop student proficiency to the extent that the course would meet the B4 criteria. The Task Force supports the development of a general rubric which can be adapted by CSU and community college campuses to evaluate courses against B4 criteria. The delicacy of these boundaries and the inevitable controversy they will cause emphasize the need for continued dialogue and development, ideally to include faculty, evaluators, and articulation officers with guidance from a CSU Center. (See Recommendation IV.)

Recommendation IIC: Define foundational quantitative reasoning. Upon entering the California State University in pursuit of a baccalaureate degree, students will be prepared to develop their ability to reason quantitatively in the broad spectrum of courses involving quantitative reasoning offered within the CSU (including, but not limited to, B4 courses). In particular, a student who has satisfied the foundational quantitative reasoning requirement shall have:

- *Demonstrated* proficiency and fluency in the combined skills found in the California State Standards for K–8, Algebra 1, and Integrated Math 1;
- *Practiced* the skills in the K-12 California State Standards for Mathematics in a variety of contexts that broaden, deepen or extend K-8, Algebra 1 and Integrated Math 1 skills;[3]
- *Developed* the eight Common Core mathematical practices, which are the abilities to:
  - Make sense of problems and persevere in solving them
  - Reason abstractly and quantitatively
  - Construct viable arguments and critique the reasoning of others
  - Model with mathematics
  - Use appropriate tools strategically
  - Attend to precision
  - Look for and make use of structure
  - Look for and express regularity in repeated reasoning.

Rationale for Recommendation IIC. While the Quantitative Reasoning Task Force found consensus fairly easily around the definition of the baccalaureate quantitative reasoning requirement, the boundaries of the foundational quantitative reasoning requirement were more problematic, as their identification required looking at what quantitative reasoning preparation a student would need in a broad range of majors, general education interests, and careers, as well as in civic life.

Moreover, this definition relates the CSU to all segments of California's public education system, as illustrated in a number of possible scenarios:

- James is a high school junior whose test results indicate he is only "conditionally proficient" in foundational quantitative reasoning. To satisfy the condition for full readiness, he would benefit from senior year course options to reach full proficiency for quantitative reasoning in the CSU.
- Samantha is a community college student hoping for an Associate Degree in Psychology. She did not graduate from high school. She needs a well-designed pathway or series of courses to achieve foundational and baccalaureate proficiency before transferring to the CSU. As much as possible this coursework should relate to her major and interests.
- Maura is a CSU entering biology major who is not proficient in foundational quantitative reasoning. She needs some developmental math coursework to prepare her for pre-calculus.
- José is an entering sociology major who is not proficient in foundational quantitative reasoning. He needs some developmental math coursework to prepare him for statistics.

[3] Including quantitative reasoning skills as practiced in high school curricula outside of mathematics.

The foundational quantitative reasoning requirement needs to address this full spectrum of students and to support a broad range of non-algebra intensive majors, general education interests, and careers, while preparing students for civic life.

In trying to identify the correct threshold for the foundational quantitative reasoning requirement, the Quantitative Reasoning Task Force relied on multiple sources, including the report [ICAS 2013] of California's Intersegmental Committee of Academic Senates (ICAS), the California State University Council of Math Chairs' *Statement on Entry Level Mathematics and Statway* [CSUCMC 2015], and evaluations of the California State Standards.

Initially the Task Force found the language of "mastered" and "practiced" (commonly used in secondary math standards) was helpful in defining the foundational quantitative reasoning threshold. It allowed the group to focus on what skills and practices were foundational and subsequently to discuss the necessary depth and breadth of student learning. In these discussions the group used "mastered" to describe internalized learning that students are prepared to apply confidently in a range of settings. The Task Force does not intend to recommend individual test instruments or any threshold scores (e.g., 80% or 90%) that may be implied by the word "mastery" in other sectors of education. For this reason "mastered" was replaced by "proficient and fluent" in item (i) of Recommendation IIB.

To get a broad and national view, Task Force members looked at reports from professional mathematics and statistics organizations, national studies, and leaders in STEM and non-STEM professions. (See Appendix D for a full bibliography.) The Quantitative Reasoning Task Force paid particular attention to majors that lead to careers in nursing, teaching, law enforcement, and business, as these non-STEM careers typically attract students who hope to move into the middle class. It also compared the quantitative skills students would need for such majors to the California State Standards for mathematical skills and practice.

The Standards of Mathematical Practice, spelled out in the California State Standards, provide a broad framework of habits of mind that, when practiced in contexts requiring mathematical skills, are *quantitative reasoning*. The mathematical skills set forth in these Standards grow upon one another in the K-12 curriculum, forming a tall, narrow tree of knowledge. In fact, this construct is central to the national Common Core Standards (on which California's are based), where skills are developed through just a few "progressions": number systems, expressions and equations, functions, geometry, and statistics and probability.

> *In general, the Common Core's progressions resist the idea of mathematics as a list of topics because lists quickly become too long for students to keep in their active memories. Rather the progressions invite students to recognize underlying principles. This recognition "shrinks" the mental real estate required for memorization while deepening mathematical understanding* [Stevenson 2015].

Because the mathematical knowledge tree is narrow, defining foundational quantitative reasoning means deciding which branches of the curriculum are fundamental to our purpose of buttressing student opportunity while maintaining maximal access to higher education.

The Task Force looked for a foundational quantitative reasoning threshold that would guarantee the mathematical skills necessary for non-algebra intensive majors, quantitative reasoning skills for life (typically taught in an "ideas in math" class), and a very

narrow list of skills and knowledge that members considered necessary for a liberal arts education.

Statistics is a non-algebra-intensive baccalaureate quantitative reasoning course. Recent work suggests that in the context of the California State Standards, to be successful in Statistics a student would need to be proficient in most of the K–8 curriculum as well as in several topics from the Algebra 1 or Integrated Math 1 curriculum. For example, a student needs to be able to evaluate algebraic expressions in order to calculate numerical summary statistics, test statistics, confidence intervals, z-scores and regression coefficients in statistics [Peck et al. 2015].

Additionally, CSU graduates in any major will likely need to manage a business budget or choose among mortgage options. Thus, they should have the necessary skills to be ready to learn about personal and business financial models: simple and compound interest, as well as the fundamentals of cost, revenue, and profit. This future learning might happen in a quantitative reasoning class, a GE elective on sustainability, or even on the student's own after graduation, but the foundations are necessary. Readiness to learn financial models requires the skills found in Algebra 1 or Integrated Math 1, such as the ability to "interpret functions that arise in applications in terms of the context" or "construct and compare linear and exponential models and solve problems".

In the course of its analysis, the Quantitative Reasoning Task Force found that the correct foundational quantitative reasoning requirement for mastered skills lies quite close to the combination of the K–8 plus the Algebra/Math 1 curriculum. This standard concurs with those of Georgia, Texas, Indiana, and Maryland and is close to the Entry-Level Mathematics threshold supported by the CSU Council of Math Chairs. In particular, the ELM threshold does not require exponential models at all, but it does require students to manipulate expressions involving ratios. The Quantitative Reasoning Task Force feels that such distinctions can be readily reconciled via broad consultation over the 2016–2017 academic year. In many cases, it may be a matter of defining more specifically what level and depth is intended by the standards.

The Task Force strongly recommends that the CSU operationalize this definition of foundational quantitative reasoning by drawing wherever possible from the California State Standards.

At the same time, the Task Force advises the CSU to monitor the impacts of this recommendation on student attainment and equity, and to continuously evaluate the connections between skill requirements and their rationales. For example, it is reasonable to say that students should be able to "evaluate algebraic expressions," "compute compound interest," or "be able to solve a linear equation in one variable" in a simple interest formula. However, it was the consensus of the Task Force that it would be unreasonable to require a student in a non-algebra-intensive field to solve for time in a compound interest formula, $A = P(1 + r/m)^{mt}$, by using logarithms. The Task Force acknowledges that the proposed recommendation is just one iteration in a series of refinements and alterations.

Implementation notes for Recommendation IIC. Just as with the current policies related to the ELM test, a standard for foundational quantitative reasoning is not intended as a CSU admissions requirement for first-time freshmen. Rather it is an expectation for entering students, which if not met at entry must be satisfied through developmental math coursework under existing guidelines.

Any measure of foundational quantitative reasoning proficiency should include as part of its criteria a proctored assessment of the skills in question.

In the short term, the foundational quantitative reasoning requirement could be implemented using the existing Smarter Balanced/SAT/ACT/ELM structure, although the thresholds of the SAT and ACT should be revised, since they are based on the old intermediate algebra standards. The Quantitative Reasoning Task Force recommends that an implementation team review this foundational quantitative reasoning recommendation in fall 2016, with particular attention to feasibility, relevance, and equity. The team should recommend any necessary changes to the Smarter Balanced/SAT/ACT thresholds and possibly to the ELM content as determined by the CSU.

The Quantitative Reasoning Task Force recognizes that quantitative reasoning as applied to a consideration of majors, careers, and civic life is an evolving construct, and that its meaning in the context of foundational and baccalaureate requirements will need to be revisited regularly. The Task Force calls on the CSU to develop a streamlined process for periodic refinement of these requirements, using evidence-based methods that take into account national trends in addition to the realities of the California public education system.

To that end, the Task Force calls upon the professional societies from both STEM and non-STEM fields to work with the Transforming Post Secondary Education in Mathematics organization (TPSE Math) to conduct an in-depth study of the logical progression in math pedagogy between the skills of Common Core Math and those of baccalaureate quantitative reasoning. Such a study has already been done [Peck et al. 2015] in the context of statistics classes for sociology and psychology, and it should also be done for "quantitative reasoning" classes and for meta-majors (see [Lumina 2014]), more broadly. Doing this in piecemeal fashion, campus by campus will merely produce inconsistent results or replicate work that should be shared. Instead, such an in-depth study is an endeavor that should engage a broad range of national experts and practitioners. Once the work is done broadly, individual departments, campuses and systems can tailor the results to their own environments based on their students, resources, and academic goals. In particular, such work could be used at the time of the next review of the foundational quantitative reasoning requirement.

Recommendation III: Ensure equitable access and opportunity to all CSU students.

Recommendation IIIA: Promote equity, access and opportunity. The Task Force recommends that equitable policies be established to provide transfer and developmental math students with increased access to quantitative reasoning courses that can open up opportunities in these students' majors, interests, careers, and civic lives.

Rationale for Recommendation IIIA. This recommendation addresses the circumstances described in "Issues of inequity" by calling on the CSU to change its policies so that transfer students and CSU first-time freshmen requiring developmental math coursework are held to the same foundational and baccalaureate quantitative reasoning proficiency standards.

Along with these changes, the Task Force encourages the CSU to ensure that

- all CSU campuses provide students with at least one B4 course that has no prerequisites beyond the foundational quantitative reasoning requirement, and that such courses be relevant to a broad range of majors and interests (e.g. statistics, ideas in quantitative reasoning, or mathematics for life);
- students with algebra intensive majors, interests, and career goals be required to take additional mathematics at either the baccalaureate or developmental

level prior to taking the appropriate B4 course as necessary. (For example, a student may need intermediate algebra or college algebra prior to taking pre-calculus or mathematical methods in business.)

Implementation notes for Recommendation IIIA. The CSU needs to develop rubrics or other means to determine whether successful completion of a course, pathway, or sequence of courses should be sufficient to demonstrate foundational quantitative reasoning proficiency.

The implementation of Recommendation IIIA will also require consideration of how students may experience these policy changes in the different contexts of high school, community college and university. In the case of high school, we make the following, additional recommendation in support of a recent resolution on the part of the Academic Senate CSU (ASCSU).

Recommendation IIIB: Require four years of high school quantitative reasoning. The Quantitative Reasoning Task Force recommends that four years of high school quantitative reasoning coursework be required as part of the CSU admissions criteria (per ASCSU Resolution AS-3244-16/APEP).

Rationale for Recommendation IIIB. As the ASCSU noted in the rationale for Resolution AS-3244-16/APEP, the success of incoming students is maximized when students maintain their exposure to mathematics/quantitative reasoning. As is the case with a second language, mathematical skills decline from lack of use, and it is important that students continue practicing and developing quantitative abilities throughout their academic careers. In a number of settings, including the CSU Admission Handbook and through CSU Mentor, the CSU already recommends four years of mathematics,[4] even though only three years are required. The standing ICAS recommendation in the "*Statement on competencies in mathematics expected of entering college students*" similarly states [ICAS 2013]:

> *For proper preparation for baccalaureate level coursework, all students should be enrolled in a mathematics course in every semester of high school. It is particularly important that students take mathematics courses in their senior year of high school, even if they have completed three years of college preparatory mathematics by the end of their junior year. Experience has shown that students who take a hiatus from the study of mathematics in high school are very often unprepared for courses of a quantitative nature in college and are unable to continue in these courses without remediation in mathematics.*

It is important to note that the fourth-year mathematics course called for by the CSU resolution would not necessarily be a fourth course in Area c; it must be a–g compliant, but it could be a course approved in Area g.

Other states in the U.S. already require a fourth year of mathematics for admission to their state university systems. For example, effective with the class entering in the fall of 2015, students in Maryland are required not only to complete four years of mathematics for entry to any of the state's public universities, but those who complete Algebra II prior to their final year must complete the four-year mathematics requirement

[4] See csumentor.edu/planning/high_school/subjects.asp.

by taking a course or courses that utilize non-trivial algebra [St. George 2014].[5] The Maryland policy was based in part on the report "*Coming to our senses: Education and the American future*" [Kirwan et al. 2008], which found that the academic intensity of the high school curriculum was the most important predictor of college success, and so recommended four years of college preparatory mathematics.

These findings and prescriptions are not new. Kirst argued in "*Overcoming the high school senior slump: New education policies*" that high schools should redesign their senior year courses to serve as gateways to general education requirements students would likely encounter in their first year of college and emphasize the importance of taking senior-year math courses [Kirst 2001]. He also recommended that colleges should include a senior-year math course in their admissions requirements.

There is a strong correlation between taking more mathematics in high school and being college-ready upon arrival at the university. Studies have documented that

1. SAT-Math and ACT-Math scores improve as the number of years of high school mathematics increases (see [SAT 2013]–[SAT 2015]);
2. the likelihood of needing remediation decreases and the likelihood of completing general education quantitative reasoning requirements increases as students take more high school mathematics (see, e.g., [USHE 2015]).

Finally, many former high school students, with the clarity of 20/20 hindsight, recognize that they should have taken more (or more difficult) mathematics courses in high school. A "one year later" survey of 1,507 high school graduates found that 44% of those students wish they had taken different courses in high school. The most frequently expressed regret (40% of this group, or more than one in every six students surveyed) was that they hadn't taken more or higher-level mathematics courses [Hart 2011]. (For further background on the subject of mathematics courses in the senior year of high school, see Appendix E.)

Implementation notes for Recommendation IIIB. If the CSU adopts this admission requirement, there will be a natural implementation phase of at least three to four years. The CSU cannot impose this requirement on students already enrolled in high school; it will be operational only as the next 8th grade class enters the 9th grade. With this in mind, the CSU needs to move forward by communicating its intention to all stakeholders and interested parties as soon as possible.

The CSU will be in a better position to assist high schools in meeting the new requirement with existing Area c and other appropriate courses as well opportunities for professional development if the system supports creation of a Center for the Advancement of Instruction in Quantitative Reasoning. The Center would be charged with developing a modular course patterned after the Expository Reading and Writing Course, which was designed to reduce remediation needs in English.

More than 60 percent of students advancing to the CSU from high school already complete four years of math. Moreover, many California high schools already offer such a 12th grade course in quantitative reasoning. The goal is to fill in the gap and overcome what might otherwise be a one- or two-year hiatus in students' use of acquired quantitative skills.

[5] For admissions requirements to the University System of Maryland, see:
usmd.edu/newsroom/news/1021;
admissions.umd.edu/requirements/Freshmen.php;
undergraduate.umbc.edu/apply/freshmen.php.

How students satisfy the requirement for 12th grade quantitative reasoning would depend on individual proficiency upon entering the senior year. It could be an a–g course that introduces new material, or a course that reinforces learning from earlier years.

High school quantitative reasoning course definition. If the a–g required coursework in math is being completed in the senior year with a course such as Algebra II or Integrated Math III, then this course will count as the student's fourth year of quantitative reasoning. If the a–g required coursework in math is being completed in the junior year, then the student must complete math-based quantitative coursework in the senior year. This requirement may be met in one of several ways:

- by completing an advanced level math course (pre-calculus, math analysis, calculus);
- by completing an Area c or g course in statistics, quantitative reasoning, mathematics or computer science or any other approved math-based quantitative Area c or g course; or
- by completing an algebra-based Area d science course (e.g., chemistry or physics).

In California, the State Standards determine what students in grades K–12 should know and be able to do in mathematics, and the Smarter Balanced Assessment is used to assess attainment of the standards. Any CSU-admissible student must have completed the full California State Standards for K–12, and so will have fulfilled the parts of the foundational quantitative reasoning requirement that oblige students to have "practiced the skills in the K–12 California State Standards" and to have "developed the eight Common Core mathematical practices".

What remains is to determine whether a student has "demonstrated proficiency and fluency in the combined skills found in the California State Standard curriculum for K–8, Algebra 1, and Integrated Math 1." As stated earlier, Title 5 requires that the CSU identify "as quickly as possible" those admitted students "who cannot demonstrate ... such basic competence" and require them to engage in what is commonly called remediation.

The junior year Early Assessment Program and Smarter Balanced Assessment results are the means for informing CSU-bound students of their quantitative reasoning status "as quickly as possible" (Title 5). The CSU designates entering students as proficient, conditionally proficient, or not proficient in quantitative reasoning for purposes of preparation for the CSU baccalaureate. By learning their proficiency status a year before they graduate from high school, CSU-bound students can proactively use their senior year to engage in quantitative reasoning coursework to help them attain proficiency prior to admission.

Below are three statements of proficiency designations and recommendations. (Note that we use the term "CSU math-eligible" to mean that a student has not only met the mathematics admission requirements to the CSU but is also ready for college-level work.)

For purposes of the recommendations below, the assumption is that Recommendation IIIA will be implemented. That is, in their senior year, students should enroll in a quantitative reasoning course as determined by their junior year Smarter Balanced Assessment proficiency status in order to reduce or eliminate the need for developmental math coursework in the CSU and at participating California Community Colleges.

- Foundational quantitative reasoning *proficient* students:
  - These students shall take any high school quantitative reasoning class as a senior.
  - They will be CSU math-eligible and will not require developmental math at the CSU or at any of the participating California Community Colleges.
- Foundational quantitative reasoning *conditionally proficient* students:
  - These students shall take an Area c or an appropriate high school quantitative reasoning course.[6] Alternatively, such students may take any quantitative reasoning high school course in conjunction with a CSU-approved method for determining foundational quantitative reasoning proficiency.
  - Students who pass the Area c high school quantitative reasoning course or an approved equivalent high school course shall not be required to enroll in developmental math at the CSU or at any participating California Community Colleges.
- Foundational quantitative reasoning *not proficient* students:
  - These students shall take any high school quantitative reasoning course (however, Area c or g is recommended) in conjunction with a CSU-approved method for determining foundational quantitative reasoning proficiency.
  - Students deemed foundational quantitative reasoning proficient via any CSU-approved method shall not be required to enroll in developmental math at the CSU or at any participating California Community Colleges.

As discussed above, the implementation of fourth-year math classes and the attendant proficiency protocol is an ambitious endeavor — one that will take time, collaboration, resources, and most importantly an attention to equity. The Task Force recommends that the time frame to implement this requirement be extended far enough to allow high schools the time needed to develop capacity. It further recommends that the CSU and CCC partner with high schools and create a Center charged with developing appropriate curricula, assessing the outcomes of that curricula, and using the evidence to inform revisions of the curricula.

Recommendation IIIC: Ensure early and appropriate quantitative reasoning courses for CSU first-time freshmen. The Task Force recommends reevaluating quantitative reasoning requirements in the context of the student's educational goals and proficiency at entry. For first-time freshmen in the CSU, it therefore recommends:

- *Foundational quantitative reasoning proficient* students shall take a baccalaureate quantitative reasoning class within the first two terms at the CSU. Options shall exist in the context of the student's major and interests.
- *Foundational quantitative reasoning not proficient* students shall demonstrate proficiency within two terms of enrollment via a CSU-approved method. They shall take a baccalaureate quantitative reasoning class within two semesters of demonstrating proficiency. Options shall exist in the context of the student's major and interests. This recommendation is intended to accommodate co-requisite remediation, at the option of the institution providing the instruction.

[6] This represents an expansion of the options for students to fulfill the conditional exemption with appropriate high school courses instead of only Area c courses. An AP computer science course could qualify in this category. Courses without Area c status would have to go though existing CSU and UC approval processes.

Rationale for Recommendation IIIC. As pointed out in Recommendation IIIB, students in algebra intensive fields like STEM or business may be required to take additional mathematics at either the college or developmental math level. This presents an interesting challenge for developmental math grades, as illustrated in the following scenarios:

- Maura is a CSU entering biology major who is not proficient in foundational quantitative reasoning. In fact she requires two semesters of developmental math work.
  - In her summer Early Start math class she is not able to apply herself fully because she is working 40 hours per week as a pharmacy checkout clerk. She makes sufficient progress to fulfill the Early Start requirement but does not improve her fall math placement.
  - In fall, she receives credit in Developmental Math 1 For Algebra-Intensive Majors. (This is a new category of developmental math course, proposed as part of Recommendation IIIC. Maura would be enrolled in it because biology is considered an algebra-intensive major.)
  - In spring, she makes progress but not enough to earn credit in Intermediate Algebra. However, her average over the course of the semester does indicate that she is proficient in foundational quantitative reasoning.
- James is a CSU entering sociology major who is not proficient in foundational quantitative reasoning. In fact, he too requires two semesters of developmental math work.
  - In his summer Early Start math class, he is not able to apply himself fully because he working 40 hours per week as a receptionist in a health clinic. He makes sufficient progress to fulfill the Early Start requirement but does not improve his fall math placement.
  - In fall, he receives credit in Developmental Math 1 For Non-Algebra-Intensive Majors.
  - In spring, he earns credit in Developmental Math 2 For Non-Algebra-Intensive Majors, a class that teaches no more content than is necessary for proficiency in foundational quantitative reasoning.

James and Maura may be comparable in their foundational quantitative reasoning abilities. Neither one should be stopped out. However, a grade of "credit" in Maura's spring intermediate algebra class would falsely depict her as ready for pre-calculus or college algebra. For such a student, an alternative to the traditional "credit" versus "no credit" grade is surely preferable. One model might be to use the grade "P" to denote that a student has demonstrated proficiency in foundational quantitative reasoning. Such a grade would leave Maura, the biology major, with a choice: either switch to a major requiring a non-algebra intensive coursework, or remain a biology major and repeat Intermediate Algebra.

Recommendation IIID: Establish equitable articulation of quantitative reasoning credit for transfer students. Community college students should be assessed by the community colleges as proficient or not proficient in foundational quantitative reasoning in alignment with the standards above. Prior to transfer, they should demonstrate foundational quantitative reasoning proficiency and earn the appropriate minimum grade in a course that transfers for B4 credit.

Such students will not necessarily be considered proficient in baccalaureate quantitative reasoning, as certain campuses may require upper division work for this designation.

Articulation for foundational quantitative reasoning proficiency will follow the existing approval process for B4 transfer approval. The Task Force supports the creation of options for both foundational and baccalaureate quantitative reasoning that teach skills and practices in the context of the student's major and interests.

Implementation notes for Recommendation IIID. To provide more equitable access to the CSU and to ensure that students are ready for the rigors of baccalaureate work, the Task Force has replaced intermediate algebra requirements with a foundational quantitative reasoning requirement. To meet the needs of all community college students who plan to transfer to the CSU, these new standards may require new approaches.

Students who are not deemed proficient in foundational quantitative reasoning by the community college assessment process will need opportunities to obtain these skills prior to transferring to the CSU. These opportunities may be embedded in, or taught as a co-requisite for, a B4 transfer level quantitative reasoning course, or they may be achieved in separate coursework. Coursework designed to address the foundational quantitative reasoning requirement should provide opportunities for students to deepen and broaden quantitative reasoning skills in a wide variety of contexts from the K–12 curriculum, as well as frequent opportunities to engage in learning experiences that promote the Common Core's mathematical practices.

The Task Force supports initiatives to ensure more equitable ways to bring postsecondary education to California's students by creating new quantitative reasoning pathways (such as those developed by the Carnegie Foundation for the Advancement of Teaching and the California Acceleration Project). The revised quantitative reasoning requirements, which bring the official position of the CSU much closer to the curricula developed in many pathways, are intended to give guidance for developing such innovations and therefore to eliminate the need for further exceptions and waivers.

Recommendation IV: Create a CSU "Center for the advancement of instruction in quantitative reasoning". As soon as possible, the CSU should create a Center for Advancement of Instruction in Quantitative Reasoning to act on the Task Force's current and subsequent findings, and to support the high-quality instruction in high schools, community colleges, and public universities that will better serve the state.

Rationale for Recommendation IV. The Task Force appreciates the rapidly changing contexts of high school instruction, best practices in postsecondary education, and the skills in quantitative reasoning that CSU students will rely on after graduation. There is a need for ongoing, consistent and coherent oversight of statewide efforts to make progress in mathematics education.

Recommendations IIIA–IIID propose profound changes to policy whose implementation will depend on deeper and more sustained partnerships with CSU colleagues in California's public schools, community colleges, and the University of California. We remark that the all-purpose label "intermediate algebra" has almost certainly conveyed a false sense of sequential learning in quantitative reasoning, while exacerbating disturbing inequities across the state. But historically it had the virtue of being unambiguous. Moreover, once faculty had set the ground rules, day-to-day operation could potentially be relegated to other segments.

By contrast, a more equitable, sophisticated and responsive expectation for quantitative reasoning at entry and graduation will be harder to "outsource". In fact, the CSU will need to take action to reconsider the notion of "intermediate algebra" and replace it with meaningful determinations of readiness at entry and transfer.

The Task Force believes that its recommendations are an important step toward such committed participation. The CSU has the capacity to bring to scale a more defensible set of benchmarks for student attainment that are informed by the California State Standards, bolstered by a universal expectation for quantitative reasoning in the 12th grade, and developed at the baccalaureate level in ways that are fair for CSU and community college students of all backgrounds.

The Center could also be an important source of intersegmental professional development and research into student flow across California's educational sectors, giving faculty the means to monitor and adjust the definitions of foundational and baccalaureate quantitative reasoning proposed here.

Implementation notes for Recommendation IV. The model for the proposed Center is the CSU Center for the Advancement of Reading, which for ten years has led development and deployment of a 12th grade Expository Reading and Writing and Course (ERWC) across the state. The ERWC has been nationally recognized for its success in improving college readiness in English, a track record that most observers ascribe to three factors in particular:

1. stable, central administration of courses that nonetheless benefit from local innovation and customization;
2. continuous development and refinement of curriculum, not just at the 12th grade level but also leading up to it, with scaffolded modules that begin as early as middle school;
3. built-in professional development for high school teachers.

The CSU Center for Advancement of Instruction in Quantitative Reasoning would be designed along similar principles, with the belief that student proficiency will be improved not by more exposure to advanced or esoteric topics in math, but by deeper and more varied practice in the concepts already learned.

The Center for the Advancement of Instruction in Quantitative Reasoning would also encompass an additional mandate: to add critical oversight and guidance for CSU and community college educators seeking to teach quantitative reasoning at the baccalaureate level. The Task Force believes the CSU's own Colleges of Education and Math Council could provide the necessary follow-through for this work as they educate the next generation of math teachers.

Over the course of its literature review and in conversations with every one of its advisors, the Task Force repeatedly encountered this message: CSU students don't need more math at entry, nor should they necessarily be expected to fulfill more requirements for many of the CSU majors. Instead, students need more proficiency in the math they already have. Requiring a fourth year of quantitative reasoning in high school and calling on our colleges and universities to broaden their conception of quantitative reasoning are important steps in the right direction. These strategies would be greatly enhanced, moreover, by the founding of a Center whose specific focus would be depth and mastery in learning.

Topics for further study

A. The Task Force urges the CSU to conduct further studies on the use of "multiple measures" of college readiness in quantitative reasoning (for example, using proficiency as measured by high school grades in addition to single-administration test measures such as the SAT or ACT). It also wishes to call attention to a significant finding: by

treating all quantitative reasoning as sequential and relying on standardized testing as the main measure of readiness, current policy may have disparate impacts on students from diverse backgrounds or on those who begin at community colleges. In particular, an updated reliability and efficacy study should be done on the ELM test. Also, data should be analyzed to determine correct SAT and ACT threshold scores for foundational quantitative reasoning proficiency.

B. Soon after its formation the Center should bring together (1) faculty in math and other quantitative disciplines and (2) representative staff in admissions, testing, evaluation, and articulation, and (3) educators at the high school level, who can develop rubrics for the determination of proficiency at entry and transfer.

C. The Center should lead development of a quantitative reasoning course in the 12th grade analogous to the Expository Reading and Writing Course for high school seniors in Area c or g (calstate.edu/eap/englishcourse). The development should be informed by the numerous, very encouraging local examples of such courses in high school and postsecondary partnerships around the state.

The new, state-level course should be made available to high school teachers in modules that apply the skills to be mastered in Algebra/Math I and others that are introduced in the full California State Standards K–12 curriculum. Importantly, the course should have a strong focus on preparing students to engage in quantitative reasoning across a wide range of majors, interests, and careers, including, but not limited to teaching, nursing, law enforcement, information technology, sustainability, liberal studies, and social sciences.

Two prominent features of the ERWC project were robust CSU faculty involvement in course development and high-value professional development for faculty and high school teachers involved in the project's implementation. We call for the same in any forthcoming Quantitative Reasoning high school model and roll-out. We also recommend that the CSU establish a permanent position and Quantitative Reasoning Board to oversee quantitative reasoning improvements as well as issues of articulation and professional development across the CSU system.

Given the recent ASCSU resolution (May 2016) calling for the establishment of a center for mathematics instruction, such a center may be the appropriate home for development and oversight of the project. (See Appendix F.)

D. Development and implementation of an upper division critical thinking assessment process that combines quantitative and expositional reasoning.

Appendices

Appendix A: Academic Senate CSU Resolution 3230-15

Establishing a Task Force on the Requirements of CSU General Education (GE) Mathematics/Quantitative Reasoning (B4) Credit

Resolved: That the Academic Senate of the California State University (ASCSU) appoint a task force to address two fundamental questions.

(a) Can the pre-requisite content for the CSU GE B4 course be met concurrently with achieving the CSU GE B4 standards?

(b) What should be the pre- (potentially co-)requisite content for quantitative reasoning and mathematical competency (CSU GE B4)?[7]

And be it further

Resolved: That the ASCSU define the membership of this task force to potentially include:

(a) a member of the General Education Advisory Committee (GEAC) Statway advisory group;

(b) another member of the GEAC;

(c) a member of the Academic Affairs (AA) Committee;

(d) a member of the Academic Preparation & Education Programs (APEP) Committee;

(e) a representative of the Math Council;

(f) a faculty member who teaches B4 outside of mathematics;

(g) a California Acceleration Project (CAP) or Statway instructor;

(h) a member of the Entry Level Mathematics (ELM) test development committee;

(i) a representative of the CSU Office of the Chancellor;

(j) a representative of the Academic Senate of the California Community Colleges (ASCCC);

(k) any other interested ASCSU faculty member.

Resolved: That the ASCSU distribute this resolution to the University of California (UC) Board of Admissions and Relations with Schools (BOARS) leadership, the General Education Advisory Committee (GEAC), the CSU Math Council, the Academic Senate of the California Community Colleges (ASCCC) Leadership, and Executive Vice Chancellor Loren Blanchard.

Rationale: Five years ago the Chancellor's Office General Education Advisory Committee (GEAC) approved a limited pilot program within the California Community Colleges in order to assess the viability of meeting CSU GE B4 quantitative reasoning requirements with a two-course integrated statistics sequence. This sequence bypasses the existing intermediate algebra proficiency in quantitative reasoning required by Executive Order (EO) 1100 as a prerequisite to CSU GE B4 courses. At its September 2015 meeting GEAC agreed to extend the pilot (at seven CCC districts) for an additional three years and invited other CCC districts to submit proposals utilizing curricular innovations in statistical pathways. In addition, GEAC called for the establishment of

[7] Executive Order 1100 specifies Intermediate Algebra; the math council statement advocates for ELM content; Statway includes a lesser amount of algebra.

a task force to include disciplinary experts to review existing B4 standards in light of the fact that some of these statistics based-pathways did not include a requirement to demonstrate proficiency in intermediate algebra prior to the award of B4 GE credit.

General education curricular standards are the province of the faculty and an expansion of the pilot has implications for CSU admissions and graduation standards and thus will rely on ASCSU action. The potential expansion of the GEAC pilot project on integrated statistical pathways for underprepared students generates a need to view the potential consequences of systemic changes to admissions standards and to EO 1100. Any potential changes will influence the minimum requirements for granting of a degree from the CSU.

Reducing achievement gaps and improving student success in meeting pre-baccalaureate and CSU GE mathematics/quantitative reasoning (B4) requirements are currently problematic. The traditional developmental pathway often constitutes a "leaky pipeline" in terms of success. As a result many students will never qualify for transfer because they cannot complete the prerequisites to CSU GE B4 requirements. Integrated statistical pathway programs such as the Statway pilot and the California Acceleration Project were established to increase the number of community college students who would satisfy the CSU GE B4 requirement. There exists early work that illustrates the effectiveness of integrated statistical pathways (e.g., Carnegie Statway, California Acceleration Project, etc.) in reducing achievement gaps and improving student success as measured by pass rates. These efforts, however, do not achieve the levels of proficiency in intermediate algebra that are currently required for CSU freshman admission and thus introduce the specter of a "lesser degree" via lowering of academic standards.

The CSU Math Council, in their statement of April 2015, advocates that all students, at a minimum, attain knowledge of content as defined by the ELM requirements prior to the award of CSU GE mathematics/quantitative reasoning (B4) requirements. The statement reads in part:

> *We oppose the replacement of elementary or introductory statistics courses at CSU campuses by any program or pathway course lacking an explicit prerequisite or co-requisite that subsumes the content of ELM. Such pathway courses include Statway. While the statistics content of Statway is totally aligned with the standard curriculum in elementary statistics, the pre-college mathematical content of Statway by itself does not meet the ELM standards and does not prepare students for college level courses. Hence Statway in its present form does not satisfactorily accomplish remediation and GE QR [quantitative reasoning/B4] in a single track, thereby pointing to the need of having all ELM content in a prerequisite or co-requisite.*

There are unresolved discrepancies among the prerequisite B4 requirement (currently "Intermediate Algebra," per EO 1100); the potential use of ELM content (per the Math Council Statement); and the absence of any such pre/co-requisites for the CSU-approved Statway pilot project (and potentially other CSU-approved projects). This resolution attempts to address these concerns.

On the question of whether or not the pre-requisite knowledge could be achieved concurrently with the other B4 requirements, the answer is likely "yes" given the existence of "stretch" courses in which the content of a single course is stretched over multiple terms to allow inclusion of pre-baccalaureate material. It remains an open

question whether or not the current pre-requisite (possible co-requisite) content should be Intermediate Algebra (per EO 1100), the material covered by the ELM exam (per the Math Council statement), or another standard (per "just in time" delivery of algebra via Statway).

A related issue of whether CSU GE B4 standards themselves could be satisfied by meeting one of two pathways (possibly STEM vs. non-STEM, quantitative-based vs. statistically-based, etc.) should also be addressed once the issues touched on by this task force have been resolved.

Useful definitions and contextualization. Title 5 requires "inquiry into mathematical concepts and quantitative reasoning and their applications" (CCR §40405.1).

EO 1100 further explicates: "Courses in subarea B4 shall have an explicit intermediate algebra prerequisite, and students shall develop skills and understanding beyond the level of intermediate algebra. Students will not just practice computational skills, but will be able to explain and apply basic mathematical concepts and will be able to solve problems through quantitative reasoning."

> §40402.1. Entry-Level Learning Skills.
>
> Each student admitted to The California State University is expected to possess basic competence in the English language and mathematical computation to a degree reasonably expected of entering college students. Students admitted who cannot demonstrate such basic competence should be identified as quickly as possible and be required to take steps to overcome the deficiencies. Any coursework completed primarily for this purpose shall not be applicable to the baccalaureate degree.

Reference: §89030, California Education Code.

Attachments: Math Council Statement; GE Guiding Notes (excerpts on B4).

Approved unanimously — September 4, 2015

Appendix B: Task Force membership

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Appendix C: Course and enrollment data

The course and enrollment data cited in this report comes from these sources:

California High School Courses in Area c: Advanced Mathematics
Source: University of California Office of the President
Data Current as of April 15, 2016

California High School Courses in Area g: Electives with Quantitative Reasoning
Source: University of California Office of the President
Data Current as of June 14, 2016

California Community College Courses Approved for Transfer Credit in B4
Source: ASSIST Coordination Site, with invited corrections from colleges
Data Current as of June 17, 2016

California State University Courses in Area B4 of the GE Breadth Curriculum
Source: CSU Office of the Chancellor, with invited corrections from universities
Data Current as of June 17, 2016

The original records as provided to the Task Force are available for download in an Excel workbook, posted with this report under "Student Preparedness/Success" at calstate.edu/AcadSen/Records/Reports/index.shtml.

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Appendix E: Additional rationale for 12th grade quantitative reasoning

Not only is a fourth year of high school mathematics already recommended for all high school students intending to enroll in the CSU, but those students who are determined to be "conditionally ready" for college-level mathematics coursework are provided with an additional incentive to continue taking mathematics in their senior year of high school: By taking an approved senior-year math course and earning a grade of "C" or better, they do not need to participate in the Early Start summer program, nor will they need to take remedial mathematics courses at the CSU.

Students who take more mathematics in high school are less likely to need mathematics remediation. The College Board College-Bound Seniors Total Group Profile Reports [SAT 2013]–[SAT 2015] show that, year after year, the average SAT math score is less than 470 (33rd percentile) [WSAC 2014] for students who have only taken 3 years of high school, almost 520 (median) for students who have taken 4 years of high school mathematics, and over 570 (66th percentile) for students who have taken more than 4 years of high school mathematics. (For reference, the SAT score that the CSU accepts as indicating incoming proficiency in mathematics is 550.) ACT reports similar data [ACT 2007] with the percentage of students reaching the proficiency level (which ACT defines as a 22 on the ACT-Math test; note that the CSU threshold is a score of 23) more than doubled (from 16% to 38%) as the years of high school mathematics increased from 3 to 3.5, and increased almost fourfold (from 16% to 62%) as the years of high school mathematics increased from 3 to 4.

Students who take higher level math classes in high school are less likely to take a remedial mathematics course in college, one-third less likely according to [ACT 2007] if they have taken any advanced mathematics course after Algebra II. The Utah System of Higher Education reports that students who successfully completed a course beyond Algebra II were more than twice as likely to successfully meet the quantitative literacy requirement in college [USHE 2015].

Finally, the Quantitative Reasoning Task Force surveyed a number of public universities and university systems across the United States and found such requirements to be in existence in at least 21 states. The related links were accessed on June 16, 2016. As not every university was checked, there may be additional institutions with this same requirement that do not appear on the following list.

Public universities and systems requiring 4 years of high school mathematics

Arizona

Arizona State University
students.asu.edu/freshman/requirements

Northern Arizona University
nau.edu/Admissions/Getting-Started/Requirements/Courses/

University of Arizona
admissions.arizona.edu/freshmen/entrance-requirements-and-guidelines

Arkansas

Arkansas State University
astate.edu/info/admissions/undergraduate/hs-core-curriculum/index.dot

University of Arkansas (Fayetteville)
admissions.uark.edu/apply/prepcore.php

University of Central Arkansas
uca.edu/admissions/apply/freshman/
arkansased.gov/public/userfiles/Learning_Services/Curriculum_and_Instruction/Smartcore_Core/smartcore_course_2015_05142015.pdf

Colorado

All four-year public institutions
highered.colorado.gov/Academics/Admissions/coursecompletion.html
highered.colorado.gov/Publications/Policies/Current/i-partf2019_Revise.pdf
colorado.edu/catalog/2015-16/content/minimum-academic-preparation-standards-maps
admissions.colostate.edu/18units/

Florida

State University System of Florida
flbog.edu/documents_regulations/regulations/6_002_FTIC Admissions_2_FINAL.pdf
admissions.ufl.edu/ugrad/frqualify.html

Georgia

University System of Georgia
usg.edu/assets/student_affairs/documents/Staying_on_Course.pdf

Indiana

Purdue University System
admissions.purdue.edu/apply/highschoolcourses.php
admissions.purdue.edu/apply/mathcourses.php

Louisiana

Louisiana State University and A&M College (Baton Rouge)
sites01.lsu.edu/wp/admissions/become-a-tiger-2/freshmen/freshman-admission-requirements/

Southern University (Baton Rouge)
subr.edu/index.cfm/page/325/n/1524

University of New Orleans
uno.edu/admissions/freshman/academic-core-curriculum.aspx

Maryland

University System of Maryland
usmd.edu/newsroom/news/1021

Note: Beginning with the 9th grade class of fall 2014, the Maryland State Department of Education has required students to enroll in a mathematics course during each year of their high school career as a prerequisite for graduation.[8]

Massachusetts

Massachusetts State University System and University of Massachusetts System
mass.edu/shared/documents/admissions/admissionsstandards.pdf
bridgew.edu/admissions/undergraduate/apply
umass.edu/admissions/apply/admissions-requirements/freshman-admissions-requirements
umassd.edu/undergraduate/about/
uml.edu/admissions/freshmen-applicants.aspx

Note: The system-wide requirements take effect for students seeking admission in fall 2016. University of Massachusetts Amherst specifically requires students to take mathematics in the senior year.

Minnesota

University of Minnesota System
admissions.tc.umn.edu/counselors/math_requirement.html

Note: This requirement took effect for students seeking admission in fall 2015.

Missouri

University of Missouri System
umsystem.edu/ums/news/news_releases/um_enhances_admissions_policy
admissions.missouri.edu/apply/freshmen/requirements/high-school-coursework.php

Nebraska

University of Nebraska-Lincoln
admissions.unl.edu/apply.aspx#admission-requirements/freshmen

[8] See marylandpublicschools.org/programs/Pages/Testing/hs_gar.aspx#HSGR.

New Mexico

University of New Mexico
admissions.unm.edu/future_students/admission-requirements.html

New Mexico State University
admissions.nmsu.edu/files/2015/11/2016-NMSU-Undergraduate-Viewbook.pdf

North Carolina

University of North Carolina System
northcarolina.edu/prospective-students/minimum-admission-requirements
admissions.unc.edu/minimum-course-requirements/

South Carolina

All public senior colleges and universities colleges
che.sc.gov/Portals/0/CHE_Docs/publications/AnnualReports/Admissions_Standards_for_First-Time_Entering_Freshmen_FY2013-14.pdf
che.sc.gov/CHE_Docs/AcademicAffairs/CollegePrepCourse_Prereqs101106.pdf
sc.edu/about/offices_and_divisions/undergraduate_admissions/requirements/for_freshmen/required_high_school_courses/index.php
scsu.edu/admissions/entrancerequirements/newfreshman.aspx

Tennessee

University of Tennessee at Chattanooga
utc.edu/admissions/apply/freshmanrequirements.php

University of Tennessee at Knoxville
admissions.utk.edu/apply/requirements/

University of Tennessee at Martin
utm.edu/departments/admissions/freshman.php

Note: The Tennessee Department of Education requires high schools students to earn four credits and to be enrolled in a mathematics course each year.[9]

Texas

The University of Texas at Austin
admissions.utexas.edu/explore/prerequisites/general-requirements

Texas A&M University (College Station)
admissions.tamu.edu/freshman/coursework

Virginia

University of Virginia
admission.virginia.edu/admission

West Virginia

University of West Virginia
admissions.wvu.edu/how-to-apply/first-time-freshmen#anchor-freshmanreqs

[9] See tn.gov/education/topic/graduation-requirements.

Wisconsin

University of Wisconsin-Madison
admissions.wisc.edu/apply/freshman/requirements.php

Wyoming

University of Wyoming
uwyo.edu/admissions/freshman/admissions-requirements.html

Additionally, some surveyed institutions, such as Indiana University Bloomington, require 3.5 years of high school mathematics.[10] Others, such as Washington State University, require students to take a math-based quantitative course in their senior year of high school.[11]

[10] See admissions.indiana.edu/apply/freshman/step-one.html.

[11] For more information on Washington State University requirements, see: catalog.wsu.edu/General/AcademicRegulations/Search/both/admission; wsac.wa.gov/sites/default/files/2014.CADRS.Overview.pdf.

Appendix F: Academic Senate CSU Resolution 3253-16

Call for a Center for Advancement of Instruction in Mathematics

Resolved: That the Academic Senate of the California State University (ASCSU) encourage the establishment of a center to support mathematics instruction, analogous to the CSU Center for the Advancement of Reading (CAR); and be it further

Resolved: That the center have among its responsibilities:

(a) development of a fourth-year high school mathematics course, analogous to the Expository Reading and Writing Course (ERWC);
(b) professional development for, and evaluation of, the fourth-year mathematics course;
(c) professional development in effective mathematics/quantitative reasoning instruction; and
(d) policy alignment in matters affecting mathematics curriculum and instruction;

and be it further

Resolved: That the ASCSU distribute this resolution to the CSU Board of Trustees, CSU Chancellor, CSU campus Presidents, CSU campus Senate Chairs, CSU Provosts/Vice Presidents of Academic Affairs, CSU Math Council, CSU Deans of Colleges of Education, and the CSU Quantitative Reasoning Task Force.

Rationale. Currently, 27% of incoming CSU students arrive unprepared to succeed in college-level mathematics. In March 2016, the ASCSU passed AS-3244-16/APEP (Rev), "Support for Requiring a Fourth Year of Mathematics/Quantitative Reasoning for Admission to the California State University". Like the Center for the Advancement of Reading (CAR), this proposed center will provide leadership, support, training, and curricular resources in mathematics instruction for CSU faculty and California's K-12 teachers.

Approved unanimously — May 19–20, 2016

Document Stack for our "Canvas Contract"
C - HSU Order Form against the MEA
B - Internet2 Customer Agreement (between the CSU and Internet2)
B - Internet2 NET+ Service Schedule for Instructure Services
B - Internet2 Customer Agreement - exhibits
A - I2 Service Provider Business Agreement (between Internet2 and Instructure)
A - I2 Service Provider Business Agreement - exhibits

Language in the I2 SERVICE PROVIDER BUSINESS AGREEMENT between Internt2 and Instructure

8.1 Rights and License in and to Enterprise Customer Data
(a) As between each Enterprise Customer and Service Provider, all rights, including all Proprietary Rights, in and to Enterprise Customer Data shall remain at all times the exclusive property of such Enterprise Customer. This Agreement does not grant Service Provider any right, title or interest, whether express or implied, in and to any data, content or intellectual property of any Enterprise Customer or Internet2, except for the limited right to process, transfer, store and archive Enterprise Customer Data as expressly stated in this Agreement solely to the extent necessary for Service Provider to fulfill its obligations under this Agreement. In no event shall Service Provider gain any right, title or interest, whether express or implied, in and to any data, content, or intellectual property of any Enterprise Customer or Internet2 as the result of any processing, transfer, storage, archiving or any other action taken by Service Provider in respect to such data, content, or intellectual property.

DEFINITIONS from the I2 Service Provider Business Agreement

"Customer Agreement" means a binding written agreement (including the NET+ Service Schedule annexed thereto and incorporated therein), whether existing as of the Effective Date or entered into on or after the Effective Date, between Internet2 and an Enterprise Customer pursuant to which an Enterprise Customer is to obtain access to the Services.

"Enterprise Customer" means each Qualified Person that has executed or executes a binding Customer Agreement with Internet2 that includes a NET+ Service Schedule with Internet2.

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"Personal Data" includes but is not limited to: personal identifiers such as name, address, phone number, date of birth, Social Security Number, and student or personnel identification number; personally identifiable information contained in student education records as that term is defined under FERPA; IP address; driver's license number; other state- or federal identification numbers such as passport, visa or state identity card numbers; account number or credit or debit card number,

or an account number or credit card number in combination with any required security code, access code or password that would permit access to an individual's financial account; and such other data and information as may be specified by Applicable Law as "personal data" or the equivalent thereof.

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This Business Agreement (this "**Agreement**") is entered into as of _____, 2013 (the "**Effective Date**") between Instructure, Inc. ("**Service Provider**"),

"Service Provider Platform" means the Canvas learning management system. The Service Provider Platform, as of the Effective Date, includes the features and functionality described on Exhibit A annexed hereto and made a part hereof.

"User(s)" means, as to any Enterprise Customer, any individual, including a teacher, student, employee, or administrator of Enterprise Customer, who is utilizing the Services through an Enterprise Customer. When this defined term is used in connection with all Enterprise Customers collectively, it shall mean the aggregate of all Users for all Enterprise Customers.

TERMS of USE (Exhibit K, attached to the I2 Service Providers Business Agreement)

(OLD)

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Language in the INTERNET2 CUSTOMER AGREEMENT between Internet2 and the CSU

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(9b) As among Enterprise Customer, Internet2 and Service Provider, all rights, including all Proprietary Rights, in and to Enterprise Customer Data shall remain the exclusive property of Enterprise Customer. The Agreement does not give Service Provider or Internet2 any rights, implied or otherwise, to any data, content, or intellectual property of Enterprise Customer, except as may be expressly stated in the Agreement or the I2 Service Provider Business Agreement. The Agreement does not give Enterprise Customer any rights, implied or otherwise, to any data, content, or intellectual property of Internet2, except as may be expressly stated in the Agreement or the I2 Service Provider Business Agreement.

University Senate
ICC Consent Calendar
09-06-2016

15-148
ANTH 671 Research Methods in Anthropology: Title and course description change to more clearly reflect the content of the course.

15-234
BFA in Fine Art: In 2014-15, a new BFA in Studio Art was approved by the ICC and University Senate, to begin in fall of 2015. Implementation of the program was delayed until after an accreditation visit by the National Association of Schools of Art and Design. The proposed refinements to the BFA in Art Studio, now renamed to the BFA in Fine Art, are in response to the accreditation and to a request from the CSU Chancellor's office to reduce units in the major to 70. Removed from the originally approved program are specific “pathway” requirements so that students engage in more cross-disciplinary investigations of Studio Art.

15-348
ENGR 211 Solid Mechanics: Dynamics: Change prerequisite ENGR 215 to Co-requisite.

15-349
ENGR 215 Introduction to Design: Restrict registration to ERE students only.

15-350
ENGR 443 Groundwater Hydrology: Prerequisite changes, all internal to and required for, the Engineering program.

15-351
ENGR 543 Groundwater Hydrology: prerequisite changes - all internal to the ERE program.

15-352
ESM program change to the GSP concentration: Inclusion of an internship requirement - inadvertently left out of the ESM program approved for Fall 2017.

University Senate
ICC Consent Calendar
09-06-2016

15-354
FORESTRY (Forest Soils Concentration) Program Change: Give students the option of taking FOR 117 or SOILS 285 as the 1-unit introduction to the major.

16-001
MUS 102 Jazz and America: Suspend Course. Topics included in upper division GE course in Jazz.

Steering/Self-Study Committee Recommendations for Strategic Plan Implementation

"HSU should take the work of the prioritization process to its logical conclusion in decisions about resource allocations."

"HSU has a record of finding ways to avoid hard decisions and failing to complete initiatives."

\- *WASC Visiting Team Recommendations, 2010*

HSU's WASC Steering and Self-Study Committee (SSSC), using the "Review under WSCUC Standards and Compliance with Federal Requirements Worksheet," evaluated HSU's performance relative to the previous WASC recommendations (see 2010 WASC Site Visiting Team Report and April 7, 2014 letter to President Richmond here: http://www2.humboldt.edu/wasc/). The SSSC identified "High Priority" and "Low Performance" Criteria for Review (CFR); these criteria were then connected to HSU's Strategic Plan Blueprint (SPB) (see Table 1). SSSC priority recommendations to the Strategic Plan Coordinating Committee are presented below.

Overarching recommendations:

1. In collaboration with the head of the division, every unit* will articulate a clear function and purpose and will participate in the process of ***continuous improvement*** using these steps:
   a. *Step 1:* Develop your outcomes (student learning and/or program). (What are you trying to accomplish?)
   b. *Step 2:* Determine criteria to demonstrate you met those outcomes. (How will you know you were successful?)
   c. *Step 3:* Based on those criteria, identify how you will meaningfully measure activity. (Measures need to align with the criteria and the outcome.)
   d. *Step 4:* Collect and analyze your data. (The evidence)
   e. *Step 5:* Based on that evidence, make specific improvements to your work and document what you did. (Plan your work.)
   f. *Step 6:* Work your revised plan by developing new/revising existing outcomes.

2. The Cabinet and President, in consultation with other stakeholders and in alignment with the Strategic Plan, will take the lead on:
   a. Clarifying the priority and sequencing of campus activity with tracking, timelines and accountability measures,
   b. Developing robust and transparent processes that use the continuous improvement processes outlined above to allocate resources in alignment with identified priorities, mission, and vision,
   c. Removing barriers to collaboration and communication across campus (removing silos),
   d. Reconfiguring existing councils and committees for transparent and efficient decision making, and
   e. Making the hard decisions to ensure positive, sustainable change for improvements in ***student learning***.

Steering/Self-Study Committee Recommendations for Strategic Plan Implementation

Specific recommendations:

1. Establish an Institutional Effectiveness Office and Council.
    a. Develop a sustainable, comprehensive, multi-year assessment plan for all units across campus.
    b. Conduct a comprehensive review and assessment of early alert and support programs that will produce "meaningful and substantial results" (WASC Visiting Team letter to President Rollin Richmond, 2014) of student success from under-represented groups, and will result in systemic changes.
    c. Create a coherent plan to effectively assess student learning.
    d. Clarify curricular alignment of course, major program, general education program, and baccalaureate degree with WASC core competencies.
    e. Incorporate assessment data into the process for proposing and approving curricular decisions.
    f. Hire an Academic Assessment Coordinator to design, implement, and evaluate campus assessment tools/processes in collaboration with a faculty committee and/or IE Council to review and summarize assessment results for the campus community to use in planning faculty development and address curricular issues.
    g. Connect results of student learning assessment to ongoing, campus-wide discussions that will define the "*Meaning, Quality, and Integrity"* (WASC) of HSU degrees.
    h. Use student learning assessment data to make recommendations for resource allocations.
2. Establish a Professional Development Office and committee that reports to the Institutional Effectiveness Council.
    a. Incorporate the development of inclusive pedagogies, applied learning approaches, core competency instruction, learning assessment, curriculum development, and other campus needs into the programming for the new professional development initiative currently underway.
3. Implement strategies for improving retention of underrepresented students, and for increasing the recruitment, hiring, and retention of underrepresented staff and faculty, in order to increase their proportion of the total population.
4. Determine and implement assessment processes that facilitate the definition of "*Meaning, Quality, and Integrity"* (WASC) of HSU degrees at both the undergraduate and graduate level.
    a. Evaluate curricula, and revise as necessary, to improve learning, retention and graduation and to reduce units to degree.
    b. Identify, evaluate and increase the various aspects of diversity embedded in curricula.
    c. Evaluate the role of HSU's General Education. Establish, support, coordination and leadership of General Education as a program.
5. Develop and strengthen connections among campus, alumni, and community to increase improve student learning and success.
6. Examine campus culture to improve collegiality and transparency across campus.

*<u>*Unit definition*</u>: *Any campus office or department with a budget and a leader, or any standing committee or working group.*

CALIFORNIA
RANGELAND
Trust

March 25, 2016

Dr. Lisa Rossbacher
President
California State University, Humboldt
1 Harpst Street, Siemens Hall Room 224
Arcata, CA 95521

Dear President Rossbacher:

The California Rangeland Trust was formed in 1998 by the California Cattlemen's Association to provide a tool for the state's ranchers to permanently conserve their working rangelands. In the eighteen years since its inception, the Rangeland Trust has permanently protected over 288,000 acres of working rangeland and the open space, wildlife habitat, air and water quality, culture, and economic values they provide. The Rangeland Trust is now the largest California land trust, with over 100 ranching families and the 400,000 acres they represent on a waiting list to be conserved forever.

We are proud of the work we do to ensure ranching families have the tools they need to survive and pass their traditions and lands to the next generation. However we could not do this without the expertise of staff, board members, and volunteers that possess the skills and education necessary to understand the rangelands upon which we all depend for the production of food and fiber. We depend on institutions of higher education to provide students with the tools they need to succeed in the field of rangeland science, who in turn bring that education and experience to the livestock and natural resource industries to continually improve their efficiency and efficacy. Humboldt State is the only baccalaureate institution in California and the loss of such an esteemed program will deliver a devastating blow to the livestock and related industries.

The Rangeland Trust depends heavily upon the skills and training of Certified Rangeland Managers (CRM's) to review, approve, and advise the myriad management plans and activities that occur on our protected rangelands. It is a requirement of state law on many of our projects to have a CRM actively involved in the review and oversight of plans and activities. The Rangeland Resource Science Program at Humboldt State is the only program in the state to offer the degree necessary to achieve CRM status. Without this program, students will have to apply, be accepted to, and travel to Oregon State in order to achieve such a degree. Sending California students out of state simply does not pass the logic test when the resources and demand are available here in the Golden State.

1225 H Street Sacramento, California 95814 Telephone 916.444.2096 Facsimile 916.329.3488 www.rangelandtrust.org

The Humboldt State University Rangeland Resources Program has tremendous community support, both locally and statewide. Such support is a testament to the quality of and demand for this highly-regarded program. The Humboldt State University Administration in 2009 challenged the Rangeland Resources and Wildland Soils program to meet three benchmarks and memorialized this challenge with a Memorandum of Understanding. The Program successfully achieved the three benchmarks and the MOU called for the addition of new tenure-track faculty position in *rangeland ecology and management* within the Program. It has been twelve years since Dr. Donald Hauxwell retired and three years since the retirement of Dr. Kenneth Fulgham. To date, neither position has been filled, despite the commitment by the Administration through the MOU.

The California Rangeland Trust implores you to consider the importance and necessity of the Rangeland Resource Science Program to the Humboldt community and state livestock, rangeland, and wildlife management. We respectfully request that tenure-track faculty be added to the program and the resources to adequately support it are committed in time for the Fall 2017 semester. The local, regional, and statewide community strongly supports this valuable program and asks that you in turn also demonstrate your support.

We thank you for your consideration of this request and look forward to the continued success of the Rangeland Resource Science Program at Humboldt State University.

Sincerely,

Jack Hanson

Jack Hanson
Chairman

TO: Dr. Lisa Rossbacher, President

Dr. Alex Enyedi, Provost and VP of Academic Affairs

Dr. Steven Smith, Dean, College of Natural Resources and Sciences

From: Dr. William Krueger, Professor and Head, Emeritus, Oregon State University

Subject: Rangeland Resources and Wildland Soils Staffing

I have been asked to provide some perspective on the value of the Range and Soils Program at HSU on their 50th Anniversary. I know you are wondering if the program really makes a difference and if it is worth it. Here is my point of view. I started my professional career in Rangeland Ecology and Management at HSU in 1966 when I accepted a GRA in Range Science from Dr. Gary Donart. I suspect that I am the first MS graduate in Range from Humboldt. I started my graduate studies in Wildlife Sciences not realizing the professional opportunities in Rangeland Sciences. After I took a Range class I was certain that I had found a way to contribute to the land and people in the west. My switch to Range Science was a great blessing. After I completed my studies at HSU and then a PhD at Utah State, I began a rewarding career that was not only a source of great satisfaction to me but also of substantial benefit to resource users in the Western States. I taught Range Sciences for a year at Humboldt and then accepted a tenure track position at Oregon State University. I retired in 2007 as Professor and Head of the Department of Rangeland Ecology and Management.

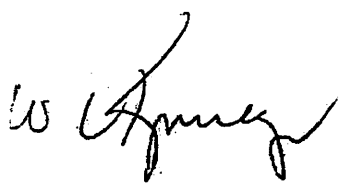
Humboldt State University's Range Science educational program got me started in a career that has had real impact on natural resources. Because of the education I received I was able to develop scientific principles that have had major economic benefits to the livestock industry, given guidance to Fisheries and Wildlife professionals in managing elk winter range and successfully grazing riparian systems without damaging salmon and steelhead spawning. I helped improve the productivity of hundreds of thousands of rangelands in Oregon and overseas. I remember a day a few years ago when I went to visit a rancher in eastern Oregon. We spent the day looking at his range management activities, grazing cattle and land improvement for forage and erosion control. At the end of the day his comment to me was; you made me about a half a million dollars today. The point of this is to show that range management has real impacts on land and people. It is an extraordinary value to society. Each graduate contributes to specific land resources and the people that need these resources. Simply put Range Management is important.

There are not very many university programs offering baccalaureate degrees in Rangeland Sciences. The discipline has a core of knowledge complemented by soils, animal science, ecology and other agricultural disciplines. The West Coast states have substantial acreages of rangelands (grasslands, shrub lands and open forests) but only two institutions HSU and Oregon

State have BS programs to develop land managers qualified to manage these complex ecosystems. The impact of each graduate on the production of livestock, wildlife, water, and a variety of amenities is great. Consequently, graduates are easily employed and have productive useful careers. In my 45 years of teaching Range Sciences I can only remember one graduate that was not employed in the field upon graduation. That student would only go to one town and there wasn't a job open at the time. He went to work in general agriculture and was successful in those endeavors.

Humboldt contributes significantly to natural resources management in the west through its Rangeland and Soils program. While it is more expensive to produce a qualified Range Manager or Soil Scientist than many other disciplines, these individuals have immense impact on the land and people where they work. Rather than looking at only student credit hours produced also consider the value of these graduates based on the benefit to California and the West. I believe then it will be clear that the investment in this program more than pays its way in benefits provided to the natural resources of California, the people of California and the excellent reputation of Humboldt State University as a natural resources college. I am proud to be a successful HSU graduate and I hope that you will continue to provide this opportunity to the young people of the state and your neighbors.

Sincerely,



William C. Krueger, Professor and Head, emeritus (Rosenfeld Distinguished Professor of Agricultural Sciences) Oregon State University

2154 SE Powells Road

Corvallis, Oregon 97333

March 15, 2016

Dr. Alex Enyedi, Provost and Vice President of Academic Affairs
Humboldt State University
1 Harpst St. Arcata, CA 95521-8299

Dear Dr. Enyedi:

The HSU Rangeland Resource Science (RRS) and Wildland Soils Program is unique, so exceptional that those of us who have earned this degree, have been able to fill a professional niche as Rangeland Management Specialists or related titles, in the State of California and beyond.

The Humboldt State RRS program offers a pragmatic education which has provided me and fellow students with secure careers. The numerous hands-on classes, participation in the HSU range plant ID team, various ranch visits and field trips all played an integral role in my success as a well-qualified natural resources manager.

During the start of my first semester at HSU in fall 2009, the RRS program was threatened with termination due to budget cuts and low enrollment. Thankfully, the program was placed on a 5 year Academic Probation to meet specified growth benchmarks instead of being axed. At the time, my advisors were mentally and physically stressed with the precariousness of their beloved program. They did everything they possibly could to find qualified instructors to teach upper division required classes. I had a NRCS soil scientist for my soil classes, an USDA inspector and Cal Poly grad for animal science, a co-taught class from a private environmental consultant and a retired rangeland management specialist. I enjoyed and benefited from this mixture of lecturers, but there was a sense of instability in the air.

I graduated from HSU in 2012, I landed a job working for the Natural Resources Conservation Service (NRCS) as a Rangeland Management Specialist in Mendocino County. I worked for the agency for 2 1/2 years making $51,000 with full benefits. I recently moved and am currently work for Contra Costa Resource Conservation District as a Resource Conservationist. Also, I have just been accepted into the Masters of Range program at UC Berkeley which I will start this fall. My success is testament of the opportunities found within the RRS program. Federal and state agencies, NGO's, land trusts, private consulting firms and other organizations recognize that HSU range and soils undergraduates are knowledgeable and qualified scientists and natural resource managers.

Humboldt State University offers the ONLY undergraduate Rangeland Resource Science degree in California. California ranchers, public land managers, and ordinary citizens need range and soils professionals to assist them with technical assistance in understanding rangeland ecosystem services and ecological functions. HSU range and soils alumni are well versed in plant identification, GIS mapping, plant and range ecology, soil processes, as well as the social and economic values associated with working landscapes.

Please offer a tenure track faculty position, is it long overdue, it will only benefit the students and support existing faculty. It would add stability, prosperity and enrollment to this interdisciplinary

program. Show your support by replacing long retired tenure staff as well as validating the accomplishments of your alumni.

Sincerely,

Allison Rofe

x Allison Rofe

Digitally signed by Allison Rofe
DN: cn=Allison Rofe, o=CCRCD, ou, email=allison.rofe@ca.nacdnet.net, c=US
Date: 2016.03.14 14:24:18 -07'00'

Allison Rofe
Resource Conservationist

Contra Costa RCD - Resource Conservationist
5552 Clayton Rd, Concord, CA 94521

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Arcata Field Office
1695 Heindon Road
Arcata, CA 95521
www.ca.blm.gov/arcata

March 3, 2016

In Reply Refer To:
4000 (CA330) P

Dr. Lisa Rossbacher, University President
Dr. Alex Enyedi, Provost and Vice President of Academic Affairs
Dr. Steven Smith, Dean, College of Natural Resources and Sciences
Humboldt State University
1 Harpst Street
Arcata, CA 95521-8299

Dear ladies and gentlemen,

As a 1993 Rangeland Resource Science graduate and 25-year field office lead botanist and range conservationist with the USDI Bureau of Land Management (BLM) Arcata Field Office, it is astonishing to me, that I have been asked once again, to provide a letter of support for the Range and Soils programs. When will the executive leadership of Humboldt State University (HSU) regard and support this program as the valuable asset that it is?

Back in the 1990's, HSU had some of the most top-notch, expert, and enthusiastic professors in the nation. Specifically, soils professor Dr. Don Hauxwell, and botanists Dr. Dennis Anderson and Dr. Mike Mesler taught me invaluable information that I have used, in some context, every day of my career. Ken Fulgham had built a wonderful and thorough rangeland management program requiring substantial core knowledge in soils, botany, plant classification, plant physiology, wildlife management, and rangeland courses. The range courses are a critical, practical, interactive skill set that must be obtained and practiced in order to successfully work with all the various land owners and managers found upon the American landscape. Animal husbandry and nutrition science, range improvements and developments, environmental planning and compliance, invasive weed treatments, grazing systems, and more, are all important areas that demand sufficient study and practice.

Managing the health of landscapes is an important field of study, particularly in an era of climate change and society's need to adapt to it. Grasslands, which cover 40 percent of the earth's surface, are home to almost a billion people, half of them living in drylands very susceptible to the influences of climate change. As warmer temperatures lead to greater transpiration and evaporation of moisture from soils, many forested ecosystems may suffer greater frequency of wildfire, beetle infestations, and general die off; thereby resulting in a shift to more shrub dominated or grass dominated landscapes. Accelerated ecological hardships will cause a demand in land managers to find ways to improve resilience of existing habitats, and consider and plan for potential assisted migration of plants that comprise the foundations of ecosystems. Further, extracting food and fiber from these stressed systems will become an even more delicate dance with climate unpredictability. More range and soil scientists will be needed with critical auxiliary knowledge in botanical taxonomy and livestock and wildlife dynamics. I can think of no other time in history, when the

importance of Range and Soils program graduates and the workforce positions they will fill could be more relevant.

An MOU between the university and the Soils and Range Department specified that by 2013 or 2015 a new tenure-track faculty should be added in the area of Rangeland Ecology, with possible support to the Forestry Fire curriculum in the context of rangeland settings. When CNRS Department Chairs met in December 2015, a new Rangeland faculty position was ranked 8th highest in priority in the college. Dean Steven Smith dropped this priority to 10th place.

The Soils and Range Department held up its end of the MOU bargain as specified:

- minimum 50 students majoring in Rangeland Resource Science,
- minimum of 12 required graduates per year (16 graduates in 2014-2015), and
- minimum student:faculty ratio in classes above 20.

Currently there is one tenured faculty member in this program, Professor Susan Edinger Marshall, and a cadre of part-time lecturers teaching courses that allow baccalaureate graduates to enter the workforce fully prepared for federal positions as Rangeland Management Specialists, Botanists, Soil Scientists, Ecologists and Soil Conservationists. Part-time lecturers are often carrying full-time careers as well, and relying on them to fill the gaps for a program the university is supposed to be committed to maintaining without their facing utter burnout is not sustainable.

The Range and Soils programs have met their program goals and grown their student enrollment levels, yet the university has failed to provide the required full-time tenure track position(s) to maintain a long-term, successful program. It takes long-term, continuity to manage a landscape – it also takes long-term, consistent program curriculum delivery to produce quality graduates. To piece-meal together teaching staff semester to semester (with cooperation from my employer (BLM) I have guest lectured, substitute taught, and have been asked to teach entire semesters several times) does a great disservice to the students, and places an unfair burden on temporary and existing teaching staff.

I strongly recommend, if at all possible, prioritize adding one, or more, tenure track positions for the Range and Soils Programs. Hold up HSU's end of the MOU bargain. Reward the program heroes such as Dr. Susan Edinger Marshall, who have shared the message and increased the involvement in this program. Reward the enthusiastic student body and alumni that recognize the importance of credentialed, well-educated and skilled current and future land managers.

Sincerely,

Jennifer Wheeler
Botanist, Arcata Field Office

Cc
Dr. David F. Greene
FWR Department Chair
Dr. Susan Edinger Marshall

February 27, 2016

Dr. Alex Enyedi, Provost
Humboldt State University
1 Harpst Street
Arcata, CA 95521-8299

Re: Support for a Tenure-Track Hire in Rangeland Resource & Wildland Resources Program at HSU

Dear Provost Enyedi,

I am writing to you on behalf of the Humboldt/Del Norte Cattlemen's Association, which voted in favor to send a letter of support for a tenure track faculty position of *rangeland ecology* in the Rangeland Resources & Wildland Soils Program at its Annual Spring Membership Meeting held Saturday, February 20, 2016. We understand that a new tenure track faculty member has not been hired in this program since 1997, *almost two decades ago.*

The 2013 Crop and Livestock Report from the Humboldt County Agricultural Commissioner's Office shows the following gross values of agricultural commodities*:

Livestock	**$76,921,000**
Timber Production	$72,520,000
Milk and Milk Products	**$61,889,000**
Nursery Stock	$49,811,000
Field Crops	$ 4,860,000
Fruit and Nut Crops	$ 1,882,000
Vegetable Crops	$ 1,427,000

Livestock and dairy are in the upper half of all agricultural commodities in our North Coast region and rely on sustainable management of rangeland and pasture. We are an organization with over 200 family and individual members, holding private ownership of a significant percentage of Humboldt, Del Norte and Trinity Counties' working landscapes. Many of our members raise and market grass-fed and organic dairy products, beef, and lamb. HDNCA members include the owners of Eel River Organic Beef, Pacific Pastures 100% grass-fed beef, Humboldt Grassfed Beef, Ferndale Farms Grassfed Beef and Lamb, Humboldt Auction Yard, and several agro-tourism enterprises and outfitters.

We understand that Humboldt State University recently completed a Strategic Plan that has among its vision and goals a desire to:

- be the premier center for the interdisciplinary study of the environment and its natural resources,

- be exemplary partners with our communities, including tribal nations,
- strengthen partnerships with local communities, and
- serve as effective stewards of the natural and built environment…

To genuinely meet the above goals, there needs to be a viable Rangeland Resources & Wildland Soils Program at HSU. Such a program serves as an educational option for our local college-bound youth and provides well-educated employees for the federal and state agencies that we work with such as; the Natural Resources Conservation Service, Resource Conservation Districts, Bureau of Land Management, US Forest Service, Northcoast Regional Water Quality Control Board, and the CA Fish & Wildlife Department. In addition, HDNCA members are willing partners in hands-on research for undergraduates and graduates in studies including grazing lands, water quality impacts, local food production, soil health, forage productivity, wildlife habitat, oak woodland conservation, and much, much more. The decades of educational interaction between the range and soils students, faculty, and ranching or dairy community has been rewarding and productive for all. Students and faculty conduct research on local agricultural landscapes and local producers host student and faculty field trips as part of the educational mission of the Rangeland Resources & Wildland Soils Program at HSU. Therefore, it is essential that a second faculty member, one in rangeland ecology, be hired into this unique and wonderful program.

*Source:
http://humboldtgov.org/ArchiveCenter/ViewFile/Item/1016source%20http:/humboldtgov.org/ArchiveCenter/ViewFile/Item/1016

Sincerely,

Les Moore, President Humboldt Del Norte Cattlemen's Association (HDNCA)
ADDRESS

CC: CNRS Dean Steven A. Smith
HSU President Lisa A. Rossbacher
FWR Department Chair David F. Greene

USDA

United States Department of Agriculture

March 21, 2016

Dr. Lisa Rossbacher, University President
Humboldt State University
1 Harpst St.
Arcata, CA 95521-8299

Dear Dr. Rossbacher,

I am sending this letter in support for the Rangeland Resources Program at Humboldt State University. It has come to my attention that the Rangeland Resource Program is lacking full time permanent academic staff to continue to effectively deliver the needed quality instruction that has been a long standing expectation from the program.

As you may know, Humboldt State University is the *only* university in the state of California that offers a viable rangeland management program wherein its graduates are eligible to qualify under the federal requirements for the GS-0454 – Rangeland Management Specialist series. As a result, HSU graduates and student interns have been sought after by our agency due to the quality of individuals that have traditionally come from your university and this program. As evidenced in the fact that the majority of NRCS rangeland management specialists in California have been Humboldt State University Rangeland Resources graduates.

However, we are concerned that without fulltime qualified academic instruction/support available to your students there will be a loss of high quality students and graduates associated with your program. This will directly have a negative effect on our agency to effectively recruit applicants/graduates to our agency to fill much needed positions. Additionally, such an occurrence will hinder our ability to continue to deliver quality rangeland management expertise to our state's ranchers, and associated natural resource partners and professionals, wherein such clientele (and our agency) has come to rely and expect from HSU Rangeland Resources graduates.

Therefore, we encourage you to give a high priority to filling the rangeland resources academic tenure track position. This position assures that the Humboldt State University continues to produce the high quality professionals that we have come to expect and know from such an important program. The Rangeland Resources Program is of utmost importance for the United States Department of Agriculture – Natural Resource Conservation Service in California.

Sincerely,

Luana Kizer acting

CARLOS SUAREZ
State Conservationist

Natural Resources Conservation Service
430 G St., #4164, Davis, CA 95616-5475
Voice: (530) 792-5600 Fax: (530) 792-5790
An Equal Opportunity Provider and Employer

Dr. Lisa Rossbacher
University President
Humboldt State University
1 Harpst Street
Arcata, CA 95521

Dear Dr. Rossbacher;

I chose Humboldt State not only for the surrounding ethereal beauty of the North Coast, but also for its sterling reputation in the field of Natural Resource Science. I took a chance on a small school 2,000 miles from home on a reputation of sustainability, job preparedness, and the possibility of enacting a lasting, meaningful change for the betterment of our world.

I graduated in 2013 with that ability and readiness to enter the professional world of natural resource management and leave a legacy of sustainability for future generations.

Having both worked and interviewed for numerous positions across the West with the Bureau of Land Management, the US Forest Service, and the Natural Resources Conservation Service, I have repeatedly encountered natural resource managers that have raved about Humboldt State graduates. Our work ethic, job preparedness, and ability to produce to the highest standard of accuracy and professionalism is unmatched by other institutions. That sentiment has been echoed time and time again.

If it were not for the devout and inspirational leadership of the Rangeland Resource and Wildland Soils faculty at HSU, I would not have the dream career that I have today.

At a time where job-seeking graduates are increasingly having a more and more difficult time finding work in their chosen field, the Rangeland Resource and Wildland Soils program is reliably sending quality graduates to work in both the public and private sector. Given that sterling reputation of HSU Range and Soils graduates, I believe the future of our nation's natural resources is in good hands, and many professional scientists and land managers feel the same way.

The Rangeland Resources and Wildland Soils program is a vital asset to the appeal of Humboldt State University. Allowing for an additional tenure-track Rangeland Ecology position will only add to that appeal and allow for the future success of Humboldt State graduates. Please honor the reputation of our natural resource science graduates and do your part to ensure Humboldt State Rangeland Resource graduates continue to have a quality foundation on which to build their careers.

Sincerely,

BRADEN PITCHER
Soil Scientist, NRCS
Dillon, MT

March 8, 2016

Dr. Lisa Rossbacher
President, Humboldt State University
1 Harpst Street
Arcata, CA 95521-8299

RE: Rangeland Resource Science (RRS) Program and the College of Natural Resources

Dear President Rossbacher:

We are writing to express our support of the Rangeland Resource Science Program, and request that you consider allocation of tenure track faculty positions to replace recently retired professor Dr. Kenneth Fulgham and formerly retired Professor Dr. Donald Hauxwell. There are few universities in the Western United States that offer this degree and Humboldt State University is the only institution in California to do so. Humboldt State University's program provides California with a prepared workforce in rangelands management.

- The program has met enrollment growth benchmarks outlined in a Memorandum of Understanding after Humboldt State University's program prioritization process of 2009.

- In spring 2015 fifteen graduates were awarded a bachelor's degree, demonstrating the demand of the program since the 2009 prioritization process.

- Graduates of the Rangeland Resource Science program are fully prepared for federal positons as Rangeland Management Specialists, Soil Scientists and Soil Conservationists.

- Humboldt State University Rangeland Resource Science Degree provides all of the necessary requisite classes to receive an Associate Rangeland Manager Certification, the first step to becoming a California Certified Rangeland Manager.

- Rangeland Resource Science graduates have a higher than average pass rate (70%) than the national average (63%) of the Fundamentals of Soil Science exam required to become an Associate Professional Soil Scientist. At the Spring 2015 exam all three HSU graduates who participated in the exam passed and were the only California examinees to do so.

We are encouraged by the progress of the program in redesigning their curriculum and meeting the goals outlined in the *Academic Program Prioritization: Final Report and Recommendations.* We also recognize the value that the program brings to the region and the state of California.

Please consider the funding of a tenure track faculty member for the program to allow for the continued success of this unique and important program. Someone from our offices will be contacting you to schedule a meeting to discuss this important issue.

Sincerely,

MIKE McGUIRE
Senator, 2nd District

JIM WOOD
Assemblymember, 2nd District

Cc: Dr. Alex Enyedi, Provost & Vice President of Academic Affairs
Dr. Steven Smith, Dean, College of Natural Resources & Sciences
Dr. Julie Alderson, Chair, University Senate & President, General Faculty

Scott Lusk
PO Box 30053
Cromberg, CA 96103
(530) 836-7165

March 14, 2016

Dr. Lisa Rossbacher
HSU President
1 Harpst Street
Arcata, CA
95521-8299

Dear Dr. Lisa Rossbacher:

I support Humboldt State University hiring a tenure track faculty position in Rangeland Ecology and Management.

I graduated from HSU in 1986. I have worked my whole career as a Forest Service Rangeland Management Specialist on the Six Rivers National Forest in California; Bitter Root National forest in Montana; Crocked River National Grassland in Oregon; and the Fremont-Winema National Forest in Oregon, because of my Bachelor of Science degree from HSU. I am currently the Forest Range Staff on the Plumas National Forest in California and I just hired a HSU Range Graduate.

Humboldt State University needs to continue its Range program by hiring a tenure track faculty position in Rangeland Ecology and Management.

Scott Lusk

CC: Dr. Alex Enyedi and Dr. Steven Smith

Dr. Lisa Rossbacher, President
Humboldt State University
1 Harpst Street
Arcata, CA 95521-8299

February 4, 2016

Dear Dr. Rossbacher,

The Buckeye is a non profit organization with 200 families, individual and commercial membership, representing over 300,000 acres of forests and ranchland found on the California North Coast. We strive to promote sound resource management practices and policies that contribute to the ecological and economic health of our regions wildlands and open spaces. We work to maintain the economically viable working landscapes of rangelands and forest lands, most of which are owned by multigenerational families.

The Buckeye would like to express its strong support for a tenure track faculty position in *rangeland ecology* for the Rangeland Resources and Wildland Soils (RRWS) Program at Humboldt State University. As an organization we understand intimately the importance of the RRWS program and rely upon its research, expertise, staff and students in order for our members to succeed at their business. Beyond that, several of the RRWS Program graduates are employed locally by the Bureau of Land Management, US Fish & Wildlife Service, US Forest Service, the Natural Resources Conservation Service, and the Humboldt Count Resources Conservation Service. These Humboldt State University graduates are immensely important in the success of the family owned working landscapes that we represent.

If such a position continues to remain unfilled, it brings about a tremendous amount of uncertainty to this vital program. The RRWS Program has an important impact the local agriculture, ranching, dairy and timber community and economy. Many of The Buckeye members have engaged in cooperative relationships with instructors, students and classes of the RRWS Program. The entire northwest California region benefits from the RRWS Program at HSU. The RRWS Program brings expertise and research to our local natural resource economy. Numerous local agencies, natural resource consultants and private businesses rely upon alum of HSU who have graduated from the RRWS Program.

The RRWS Program is not only important locally, but on a state level as well. HSU offers the only full undergraduate Rangeland Resources degree program in California, and only one of two found in the Pacific Coast states. The RRWS Program is producing graduates who are needed in the workforce. The majority (90+%) of the Rangeland Resources and Wildland Soils graduates obtain career employment upon graduation as Rangeland Specialist, Soil Conservationist, or Soil Scientist with different a variety of federal or state agencies, non-government organizations, and private consulting firms.

Upon reviewing the HSU 2015-2020 strategic plan, there are many goals that align with what the RRWS Program provides for the local community and for HSU. Taken directly from the mission, value and vision statements:

- "We will be the premier center for the interdisciplinary study of the environment and its natural resources."
- "We will be renowned for social and environmental responsibility and action"
- "We believe the University must assist in developing the abilities of individuals to take initiative and to collaborate in matters resulting in responsible action."
- "We believe individuals must be environmentally, economically, and socially responsible in the quest for viable and sustainable communities."
- "We believe the University is an integral part of our local and regional communities."
- Goal 3 of the HSU strategic plan states: "Strengthen partnership with local communities."

To assist in accomplishing the goals of the HSU 2015-2020 strategic plan, The Rangeland Resources and Wildland Soils Program definitely and strategically needs a tenure tract professor position in *rangeland ecology*. Please discuss this situation with your new Provost, Dr. XXXXXXX and CNR&S Dean Steven Smith. If you have any questions or wish to discuss this with me, please contact me at:

- James L Able Forestry Consultants
- (707)445-4130
- jable@ableforestry.com

Sincerely,

Jim Able, Chairman
The Buckeye Conservancy

USDA United States Department of Agriculture | Forest Service | Stanislaus National Forest

19777 Greenley Road
Sonora, CA 95370
(209) 532-3671
FAX: (209) 533-1890
TTY/TDD: (209) 533-0765
http://www.fs.fed.us/r5/stanislaus

File Code: 2200
Date: March 21, 2016

Dr. Alex Enyedi
Provost & Vice President of Academic Affairs
Humboldt State University
1 Harpst Street
Arcata, CA 95521-8299

Dear Dr. Enyedi:

I am extremely proud to have attended Humboldt State University and am fortunate to have been part of the Rangeland and Soils program. I graduated in 1994 with a B.S. in Rangeland Resource Science. It was a challenge at that time to find permanent employment in Federal service. However, I always felt my degree from Humboldt gave me an advantage. There were always many other HSU graduates working for the Forest Service and Bureau of Land Management.

In 20 years with the Forest Service I have worked in multiple positions always, in some way related to the rangeland environment. The inspiration I received from the Humboldt faculty and staff helped me to quickly propel my career to become a Forest Rangeland Manager and eventually to become the Regional Rangeland Program Manager for the Pacific Southwest Region of the Forest Service.

I have since returned to working at the Forest level where I feel I have more involvement in the actions being taken toward managing public lands. I continue to benefit from the relationships made while attending Humboldt and the comradery of other HSU alumni. Several other peers and employees I supervise have attended Humboldt State University and were part of the Rangeland Resource Program.

I encourage the university staff to support the Rangeland Resources and Wildland Soils Program and secure a tenure track position in the Rangeland Science field.

Sincerely,

Crispin Holland

CRISPIN HOLLAND
Forest Range and Wildlife Program Manager

cc: Dr. David F. Greene, FWR Department Chair, and Susan E. Marshall

February 24, 2016

Dr. Alex Enyedi, Provost and Vice President of Academic Affairs
Humboldt State University
1 Harpst Street
Arcata, CA 95521-8299

RE: HSU Rangeland Resource Science Program

Dear Dr. Enyedi,

We are writing to express our concerns regarding the future of the 50 year old Range and Soils Program at HSU. It appears this curriculum is heading towards elimination through attrition by not filling faculty vacancies.

We are ranchers from Ferndale - part of a larger community that stewards over a half million acres of Humboldt's family owned range and timberlands – some of the most productive and well cared for in the world! We have all benefited from the Range and Soils program directly or indirectly.

In our case, we were seriously challenged a few years ago by some neighbors and the North Coast Regional Water Quality Control Board regarding our grazing operation on the South Fork of Elk River. In spite of following management protocols designed by UC Davis, NCRWQCB felt obligated to conduct an eight month water testing regime which took samples up and down the river when our cattle were present and also when they were grazing elsewhere. The results of that study were somewhat counter intuitive and did not match the expectations of some of our detractors.

Fortunately, we had allowed one of Susan Marshall's graduate students to conduct a similar study on our Elk River property as part of his graduate thesis. The results of Justin Harrison's water sampling mirrored those of the State and, along with a strong letter of support from Susan, silenced those who would have otherwise challenged the State's initial findings. These two studies validated our management practices and demonstrated to the Board that proper grazing practices and protecting water quality are not mutually exclusive. It also set a very important precedent – not just for our operation – but for other graziers State wide. Absent Justin's project and Susan's letter, this issue could have dragged on for some time with additional unnecessary costs to us and the State. The support we received was, as they say, "priceless".

More broadly, there are a number of graduates of HSU's range program employed by entities in the County that provide support and best range management practices to local ranchers: Resource Conservation District, Natural Resources Conservation Service, and Bureau of Land Management among them. Their expertise helps bolster the viability of family ranches which

protect hundreds of thousands of acres of healthy landscapes and open space in Humboldt County and beyond.

We urge you in the strongest terms to provide tenure-track faculty positions to insure the continuation of this vital program.

Thank you for your thoughtful consideration.

Sincerely,

Andy and Sandy Westfall

Cc: Dr. Lisa Rossbacher, President, HSU
Dr. Steven Smith, Dean, College of Natural Resources and Sciences

USDA United States Department of Agriculture
Forest Service
Sierra National Forest
Bass Lake Ranger District
57003 Road 225
North Fork, CA 93643
559-877-2218
FAX: 559-877-3108

File Code: 2270
Date: March 17, 2016

Dr. Lisa Rossbacher
University President
Humboldt State University
1 Harpst Avenue
Arcata, CA 95521

Dear Dr. Rossbacher;

Passion inspires. It is what makes a great land manager. I was fortunate to graduate from Humboldt State University in 1998 with a B.S. in Rangeland Resource Science. As an undergrad, I enrolled in the Student Career Experience Program in 1995 which has sustained a 20-year career with the U.S. Forest Service as a Rangeland Management Specialist working on national forests in both Oregon and California. It is my good fortune to have employed and continue to work with HSU graduates of the Rangeland Resource and Wildland Soils Program.

My academic and professional ambitions and achievements were inspired by the faculty of Rangeland Resource and Wildland Soils Program including Professor Kenneth O. Fulgham, Soils Professor Donald L. Hauxwell, Professor Norman Greene and Professor Susan Edinger Marshall. These faculty and their passionate involvement and facilitation in HSU's rigorous range curriculum, Range Plant Team, Society for Range Management International symposia and Range Club led to me to a career and network of professional and personal connections of which I, and more importantly the rangeland resources I manage, continue to benefit.

What better way to honor the 50-year history and anniversary of HSU's range program, as well as your position and commitment to inspire the next generation of range and resource managers than with a new tenure track faculty position in Rangeland Ecology.

Sincerely,

Aimee Cox

AIMEE COX
Rangeland Management Specialist

cc: Dr. David F. Greene, FWR Department Chair, and Susan Edinger Marshall

Provost Alex Enyedi
President Lisa Rossbacher
Dean Steven Smith
Chair David Greene
Professor Susan Marshall
Humboldt State University
1 Harpst Street
Arcata, CA 95521

10 March, 2016

Dear Sirs/Madams:

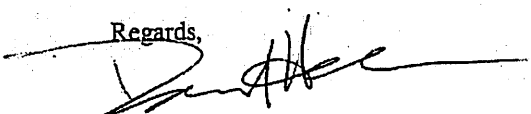
I am writing this letter in support of the HSU Rangeland Resources & Wildland Soils Program within the Department of Forestry & Wildland Resources, which I know was challenged to meet some significant targets, and meet them on-schedule. I now understand that the administration of Humboldt State University, in particular many of you, is considering going back on your word regarding the outcomes of meeting the agreed targets.

I am a graduate of Humboldt State University, where I finished my Master's Degree, under the supervision of Dr. K.O. Fulgham, in collaboration with the Forestry and Wildlife Departments. Dr. Fulgham and the Range Management Department (as it was then called) were instrumental in providing me with the background I needed to further my career – a career that has included a Ph.D. from the University of Georgia, positions in The Nature Conservancy, International Union for Conservation of Nature, and, currently, as the Manager of Environment & Biodiversity for Oyu Tolgoi LLC, what is going to become the third largest copper and gold mine in the world. The education that I received was only slightly less important than was the mentoring that I received as part of the Range Department, and the broader School of Natural Resources at Humboldt State.

I have no doubt that, had my career path not gone through HSU and, in particular, the HSU Range Department, that I would not be where I am today, and I would not have the global perspective regarding rangeland, forestry, and wildlife conservation.

I am extremely disappointed that the most senior HSU leadership is on the verge of going back on their word, especially after the hard work and dedication, to the profession and future generations of rangeland students, of, amongst others, Drs. K.O. Fulgham and Susan Marshall. I would think that leadership by example, if nothing else, would result in the correct decisions regarding the HSU Rangeland Resources & Wildland Soils Program.

Regards,



Dennis A. Hosack, Ph.D.
Manager, Environment & Biodiversity
Oyu Tolgoi LLC

HUMBOLDT STATE UNIVERSITY
University Senate

Resolution Demanding President Rossbacher Approve the University Senate Recommended Intellectual Property Policy for Humboldt State University

02-16/17-Abell/Thobaben - September 6, 2016

RESOLVED: That the University Senate of Humboldt State University demand that President Rossbacher approve the Intellectual Property Policy recommended by the Senate as per Resolution #24-15/16-FAC; and be it further

RESOLVED: That this policy act as the interim Intellectual Property Policy for the campus until the end of the 2016/17 academic year, at which point it may be renewed or considered for revision pending development of a CSU system-wide intellectual property policy; and be it further

RESOLVED: That the Chair of the Senate forward copies of this resolution to: Chancellor Timothy P. White, ASCSU Chair Christine Miller, CSU-CFA President Jennifer Eagan, CSU ERFA President William Blischke, and HSU ERFA Chair John C. Schafer

RATIONALE: *HSU's Intellectual Property Policy (EM P09-03) was an interim policy recommended by the Academic Senate through Resolution #5-08/09-FA (attached) and approved by then President Rollin Richmond in May 2009. The third resolved of that resolution reads: "That the Academic Senate of Humboldt State University recommends to the President that the interim period shall end when the CSU Administration and the California Faculty Association (CFA) successfully negotiate the definition of 'extraordinary support' in the Collective Bargaining Agreement (CBA), at which time the policy must return to the Academic Senate for revision and ratification as a permanent policy."*

The 2014-2017 Collective Bargaining Agreement between Unit 3 employees and the CSU was ratified by CSU Trustees and the California Faculty Association in May 2015. The two parties agreed not to define "extraordinary support" system-wide, but to defer the definition to individual campuses. As the definition of "extraordinary support" is no longer in the hands of the CSU or CFA, the condition for the end of HSU's interim Intellectual Property Policy has already been met. Thus, HSU has no campus wide intellectual property in force at this moment.

During the 2015/16 academic year, under the stewardship of the Faculty Affairs Committee and through much input from faculty, students, staff and administrators, a new Intellectual Property Policy was developed. This policy was extensively debated, revised and perfected through the shared governance mechanism of the University Senate. In May 2016, the University Senate approved Resolution #24-15/16-FAC *(attached) which recommended this policy to President*

Rossbacher by a vote of 22 in favor, none opposing and one abstaining. Four months later, the policy still sits on the President's desk awaiting approval.

HSU does not have an Intellectual Property Policy in force at this moment. HSU has developed a good policy that has been vetted through shared governance. HSU needs that policy approved now.

Attachments: Resolution #24-15/16-FAC; Resolution #05-08/09-FA