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*Chair of the Assembly and the Academic Council
Faculty Representative to the Board of Regents
University of California
1111 Franklin Street, 12th Floor
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August 12, 2010

**ROBERT POWELL
SENATE CHAIR, UC DAVIS
UNIVERSITY OF CALIFORNIA**

Re: Area 'd' Laboratory Science Admission Requirement/EESS Courses

Dear Bob:

As you know, at its June 30 meeting, Academic Council unanimously declined to expand the language of Area 'd' to specifically include EESS courses along with the fundamental sciences of biology, chemistry and physics. However, in making this recommendation, Council members also requested that BOARS examine whether it is desirable to expand the Area 'd' language in the systemwide Senate Regulations to include a description of alternative approaches that could meet the laboratory science requirement.

Specifically, BOARS considered UCEP's requests to do the following:

- Amend Senate Regulation 424.3.d to better communicate, especially to the public, alternatives to the traditional three laboratory sciences acceptable for Area 'd' under current policy.
- Consider an alternative process by which alternative Area 'd' courses are more visibly acknowledged as being legitimate, and that there be an option to define a template in a more specific instructional area that would facilitate development of appropriate courses.
- Develop templates defining specific content for integrative courses that would be acceptable as Area 'd' courses.

With respect to the first request, BOARS believes that the A-G Guide is a better venue for indicating alternatives available to high schools than Academic Senate regulations, and it also serves as UC's "public face" for the a-g requirements. In addition, the statement in the A-G Guide is more comprehensive than UCEP's suggested wording, and therefore BOARS has concluded that no change to the Senate Regulations is warranted. BOARS responds to UCEP's latter two requests by noting that such "templates" have been, or are in the process of being, developed. For example, the UC Office of Admissions, together with BOARS, launched an effort to develop and attract interest in Career Technical Education courses in the 'a-f' areas, including providing templates for developing visible and legitimate alternate ways to develop integrative 'd' courses, including EESS.

That said, BOARS agreed that more exemplars need to be presented on the UC Doorways website, and it will continue to work on the development of such exemplars in the future.

Please do not hesitate to contact me if you have any questions.

Sincerely,

A handwritten signature in dark ink, appearing to read "Henry C. Powell", with a long horizontal flourish extending to the right.

Henry C. Powell, Chair
Academic Council

Encl: 3

Copy: Academic Council

Martha Winnacker, Academic Senate Executive Director



BOARD OF ADMISSIONS AND RELATIONS WITH SCHOOLS (BOARS)

Sylvia Hurtado, Chair
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July 23, 2010

HENRY POWELL, CHAIR
ACADEMIC COUNCIL

Re: Systemwide Review of Area ‘d’ laboratory science admission requirement

Dear Harry,

As the Senate’s designated authority on admissions requirements, BOARS was asked to examine a proposal to expand UC’s Laboratory Science (area ‘d’) admissions requirement language to include Earth, Environmental, and Space Sciences (EESS) as a choice to fulfill the requirement, along with the fundamental sciences of biology, chemistry, and physics. BOARS discussed and opposed this proposal, but the Academic Council recommended in January 2009 that it undergo systemwide Senate review to ensure that UC faculty had an opportunity to provide informed opinions to the Senate leadership in order to bring the discussion to a definitive conclusion. The issue has a long history. It has been reviewed and rejected by four different BOARS committees (each of which included science and EESS faculty) as well as discussed in an intersegmental Task Force and three Academic Councils. After the most recent systemwide review concluded in June 2010, revealing a broad consensus opinion opposing the expansion of area ‘d’ language in policy documents, Council voted unanimously to decline the proposal to expand the language of area ‘d’ to include EESS. BOARS believes that it is Senate’s essential obligation to listen to faculty directives and bring this issue to rest.

Council also passed a motion at the June meeting asking BOARS to consider an expansion of area ‘d’ language in Senate Regulations to include a description of alternatives to meeting the laboratory science requirement. Discussion focused particularly on the integrative sciences. In addition, UCEP’s review of the EESS proposal includes a suggestion for revising SR424.3.d, and calls on BOARS to work with course approval staff to increase the number of EESS courses available for area ‘d’.

BOARS has considered Council’s and UCEP’s suggestions carefully, and would like to clarify two points. First, we recently revised the area ‘d’ language in the A-G Guide to incorporate the points UCEP raises, which we believe is the appropriate vehicle to communicate to schools about the possibility of integrated or interdisciplinary courses meeting ‘d’. Second, BOARS and course approval staff have been involved in developing initiatives described in the UCEP memo, and will continue to do so.

UCEP's first suggestion is to revise the language of SR424.3.d relating to the fundamental disciplines to something like the following:

Laboratory science, 2 units, two years of laboratory science providing basic knowledge in at least two of the fundamental disciplines of biology, chemistry, and/or physics; alternatively one of the courses can be an approved interdisciplinary science course that meets the Laboratory Science course requirements. (UCEP letter)

UCEP's suggestion is based on the idea that while alternatives to the traditional three laboratory sciences are indeed acceptable for area 'd' under current policy, there might be a more effective way to communicate these possibilities to the public (especially high school leadership).

In fact, BOARS maintains a primary policy document, the A-G Guide¹, which is designed to convey clear messages to schools, counselors, teachers, and students. The Office of Student Affairs and course approval staff also alert BOARS to potential changes based on their interactions with schools and teachers modifying their courses to meet UC requirements. UC invests considerable expense and faculty time to review the A-G criteria before any changes are made to any subject area, employing expertise from UC, CSU, community colleges and high school teachers. In fact, an intersegmental task force recently completed this work for areas 'c' and 'd' to clarify the area 'd' language for schools. The opening paragraph from the area 'd' description, available to the California public on the A-G website, reads:

The intent of the laboratory science requirement is to ensure that entering freshmen have a minimum of one year of preparation in each of at least two of the areas of Physics, Chemistry, and Biology/Life Science. This requirement can be satisfied by taking two courses from among these specific subject areas, but courses from across the broad spectrum of scientific subjects are potentially acceptable, provided they conform to the Course Requirements specified below.

Later, this Guide provides the following Course Requirements:

Regardless of the scientific subject, all approved courses are expected to satisfy these criteria:

1. Courses should be consistent with the Goals described above.
2. Courses must explain the relevant phenomena on the basis of the underlying biological, chemical, and/or physical principles, as appropriate. They should provide rigorous, in-depth treatments of the conceptual foundations of the scientific subject studied.
3. Courses should afford students opportunities to participate in all phases of the scientific process, including formulation of well-posed scientific questions and hypotheses, design of experiments and/or data collection strategies, analysis of data, and drawing of conclusions. They should also require students to discuss scientific ideas with other students and to write clearly and coherently on scientific topics.
4. Courses must specify, at a minimum, **elementary algebra as a prerequisite or co-requisite**, and should employ quantitative reasoning and methods wherever appropriate.
5. Courses must take an overall approach that is consistent with the scientific method in relation to observing, forming hypotheses, testing hypotheses through experimentation and/or further observation, and forming objective conclusions.

¹ http://www.ucop.edu/a-gGuide/ag/a-g/science_reqs.html

6. Courses must include hands-on scientific activities that are directly related to and support the other class work, and that involve inquiry, observation, analysis, and write-up. **These hands-on activities should account for at least 20% of class time, and should be itemized and described in the course description.**
7. The content for Physics, Chemistry, and Biology/Life Sciences courses in grades 9 through 12 will usually be drawn from the [Science Content Standards for California Public Schools \(pdf\)](#), and may, in some cases, also be drawn from the [California Career Technical Education Model Curriculum Standards \(pdf\)](#). While these standards can be a useful guide, coverage of all items in the standards is not necessary for the specific purpose of meeting the subject requirements for university admission. Likewise, simple coverage of all standards is not enough to assure course approval. For success in college, secondary science teachers should help students learn to assimilate the major ideas and principles that encompass the standards rather than explore the breadth of all the standards. More important than the topics covered, or even than the skills directly used in class, are the more general abilities and attitudes gained through the effort of mastering the course content. These general abilities and attitudes are described in the Goals section above.²

BOARS further observes that at the end of the area ‘d’ Guide, Note 2 reads as follows:

Students who have successfully completed an approved three-year integrated-science sequence will have met the two-year “d” requirement as well as the one-year “g” elective requirement. Students electing to enroll in an integrated-science program (ISP) are strongly advised to complete the entire three-year sequence. In most cases, the first year of an integrated-science sequence fulfills only the “g” elective requirement; the second and third years of the sequence then fulfill the two-year “d” laboratory science requirement.

For quite some time, educators have attempted to provide integrated approaches to teaching science in California high schools (going back at least to the 1991 *K-12 Science Framework for California Public Schools*). BOARS does track these efforts, and the language in Note 2 provides guidance for the typical integrated course currently available to schools. Therefore, UCEP’s suggestion that interdisciplinary (or integrative) courses be addressed is already covered by the current area ‘d’ description in the A-G Guide. This language was carefully crafted two years ago by an intersegmental task force reviewing areas ‘c’ and ‘d’, and was reviewed and approved by BOARS. We believe the A-G Guide is a better venue for indicating alternatives available to high schools than the Academic Senate Regulations on admissions, which are meant to be concise statements of central policies that leave room for changes in implementation. There are many other types of integrative, interdisciplinary high school courses not only in the sciences, but also in mathematics (area ‘c’), writing (‘b’), and history/social science requirement (‘a’). These are too numerous to list in Academic Senate regulations, but are clear in counselor materials and the A-G Guide. Moreover, because the A-G Guide really is the public face of UC relating to a-g requirements, and because this statement is more comprehensive than the suggested wording by UCEP, BOARS has concluded that no change to the Senate Regulations is warranted.

The A-G Guide provides clear information to schools about three routes to d-certification of a non-biology, chemistry, or physics course: 1) the course can be centered on some “integrative” science discipline, but provide a year’s worth of biology, chemistry, or physics; 2) the course can be an advanced course that specifies biology, chemistry, or physics as a prerequisite; or 3) it can be satisfied by three years of an integrated science course as described in Note 2, provided two

² http://www.ucop.edu/a-gGuide/ag/a-g/science_reqs.html

years of material from the basic three subjects is embedded across those three years. Furthermore, UC has been a partner in developing CTE courses that meet either 1) or 2) and a new “blending rule” has just been adopted by BOARS making it possible for multi-year advanced CTE courses to provide a year’s area ‘d’ credit if a year’s worth of biology, chemistry, or physics credit was completed across multiple years.

UCEP suggests further that the shortage of area ‘d’-level EESS courses may be more an issue of marketing than policy, which provides the basis for their suggestion. After referring to this shortage, they say,

However, Moores also cites the presence of only a few EESS approved area “d” courses as a deterrent to getting support for such classes from high school principals because they see the minimal course listings as evidence UC does not value courses in this area. This seems to be more an issue of presentation or marketing rather than a question of scientific merit. For this reason, UCEP suggests considering an alternative process by which alternative area ‘d’ courses are more visibly acknowledged as being legitimate, and that there be an option to define a template in a more specific instructional area that would facilitate development of appropriate courses.

BOARS recognizes there are not many EESS courses that meet the area ‘d’ standard, but believes that the problem is almost exclusively a result of California K-12 policy, not shortcomings in a-g. The single greatest determinant of K-12 curriculum in this state is the California Standards, which define exactly what will appear on the California Standards Tests (CST). In today’s high stakes testing environment, schools are under intense pressure to align courses with and teach to the content of these tests. The Earth Science Test is by far the easiest CST high school science test. Many schools send students to this course whom they believe would have difficulty completing any other science course (or do well on the CST in another area). For this reason, most Earth Science courses are set at far too low a level for area ‘d’ consideration (a fact recognized by both sides of this discussion). In 2009, the Standardized Testing and Reporting (STAR) results show that 29.2% of California 9th grade students took the CST Earth Science test, and only 29% scored proficient or above, so the primary incentive for most schools is to offer a course that aligns with the test rather than a more rigorous course that could meet area ‘d’. When the pressures to teach courses that are aligned with this test subside, BOARS believes the existing structures in our a-g work will yield more fruit. This will happen only when either the testing pressures are relieved or the Standards are changed. The latter is a real possibility in the next two years given the success of the national standards movement the past few months, and a set of national science standards is set to be drafted soon. BOARS is hopeful that the national standards might make a difference.

UCEP also suggests that BOARS (or admissions requirements staff, as appropriate) develop templates defining specific content for integrative courses that would be acceptable as area ‘d’ courses. In fact, efforts of this type have been underway for some time in various forms. Most recently, the UC Office of Admissions, together with BOARS, launched an effort to develop and attract interest in Career Technical Education courses in the ‘a-f’ areas. This work is already providing templates for developing visible and legitimate alternate ways to develop integrative ‘d’ courses, including EESS. In other words, this suggestion is in place. But as noted by participants at the May 2010 UC Curriculum Integration Institute (focused on area ‘c’ and CTE), the most serious limitations to change are K-12 institutional obstacles, namely the standards and tests. In fact, an innovative Digital Arts Academy Principal mentioned at the Institute that all students in the Academy take Earth Science in 9th grade, a requirement that is tied rigidly, by necessity, to the standards—and that is the way it will continue because the test scores have to be maintained. In spite of this, BOARS agrees that more exemplars need to be presented on the UC

Doorways website³, and part of the CTE and UC curriculum integration work over the past year has been to help develop and post these exemplars—a process that will continue into the future.

Finally, we note that the systemwide review reveals that several divisions do not support expansion of area ‘d’ language to include specific mention of courses other than the three fundamental courses already in all policy documents. The Berkeley Division states “there are already mechanisms in place for exceptional courses that do meet the criteria to be included in the Area D list. Therefore there does not need to be any modification of the Area D language.” Berkeley does support the inclusion of language for other courses, but only if we expand the current requirement to three years. The Davis Division specifically states “the rationale for changing UC admissions policy should not be confined to simply encouraging high schools to innovate science curricula. This message could, and should be transmitted by UC in ways that do not require formal revision of admissions requirements.” The Irvine Division concurred that “the current policy is adequate, and recommended against including integrative science courses to the list.” The UCLA Division points to the difficulty of high schools to offer quality integrative types of courses, and commends the better resourced schools that are able to do so and have their courses approved by UC. Several campuses suggest including specific types of integrative science courses if there were a three course science requirement. BOARS can continue to examine the feasibility of these suggestions despite current economic constraints on schools.

Given the clear result of the systemwide review, and the detailed A-G policy guide recently revised by an intersegmental task force, BOARS voted unanimously on July 9th to oppose changing Academic Senate Regulations. The Regulations, including SR424.A.3.d and the A-G Guide, are consistent and should not be changed. Each has a different role and audience. The Guide articulates not only the requirements incumbent upon freshman applicants, but also those for high schools as they design courses that their students can use to satisfy UC requirements. BOARS will continue to examine ways of clarifying the eligibility of interdisciplinary science courses as an admission pathway for ‘area d,’ and additional suggestions were offered to UCOP Admissions to clarify language on the website as a result of our discussion. In addition, BOARS will explore the development of curriculum workshops for high school teachers to improve EESS courses to become acceptable as college ready courses for UC.

BOARS thanks UCEP and the Senate Divisions for the time and care with which they have examined this issue. We are pleased to continue to strive for increasing the number of a-g courses offered in schools and, at the same time, ensure the rigor of preparation in science for student success.

Sincerely,



Sylvia Hurtado
BOARS Chair

cc: BOARS
Martha Winnacker, Senate Executive Director

Encl: 1. Summary of Systemwide review
2. Area ‘d’ description from A-G Guide

³ <http://www.ucop.edu/doorways/>

SUMMARY OF SYSTEMWIDE RESPONSES TO THE PROPOSAL TO EXPAND AREA ‘D’ TO INCLUDE EESS COURSES

Oppose Expansion of Area ‘D’ Language

UC Berkeley: “we agree with the position adopted by the Board of Admissions and Relations with Schools, and the University Committee on Educational Policy opposing the inclusion of EESS among courses satisfying the Area “d” requirement,” UCB advocates a strengthening of science preparation for UC applicants, preferring 3-4 science courses.

UC Davis: “the proposal was not supported...there is a strong belief that the rationale for changing UC admissions policy should not be confined to simply encouraging high schools to innovate science curricula. This message could, and should be transmitted by UC in ways that do not require formal revision of admissions requirements.”

UC Irvine: “The Cabinet agreed that the current policy is adequate, and recommended against including integrative science courses to the list. It might be beneficial to add a footnote that indicates that EESS and other courses oftentimes fulfill this requirement. The Cabinet also thought that it might be beneficial to increase the number of science courses required for admission.”

UCLA: “..we do not believe that the proposed expansion of the Area “D” requirement to include EESS courses represents the UC’s best option in improving science education.”

UCSD: Reviewers found BOARS’ arguments in opposition to the expansion proposal compelling and were supportive of BOARS’ position.

UC Santa Cruz: “We do think that it is possible to teach a course in EESS in as rigorous and demanding a fashion as an eligible Physics, Chemistry, and Biology course; however, it is our overwhelming view that Area “d” sciences should not only be rigorous but “fundamental,” that is, prepare students for further study of science at UC and that EESS does not meet this criteria.

Oppose, Offers Alternative:

UCEP: “We tend to agree with BOARS that EESS or other integrative sciences should not specifically be identified along with biology, chemistry and physics in the fundamental discipline designation, but we propose below adding a statement that makes it more clear how other types of integrative or science-related subject area courses, such as those suggested by EESS, can be appropriate for area “d” requirements...UCEP suggests that the area “d” requirement in senate regulations be reworded with language similar to the following:

Revision to SR424.2.d

Laboratory science, 2 units, two years of laboratory science providing basic knowledge in at least two of the fundamental disciplines of biology, chemistry, and/or physics; alternatively, one of the courses can be an approved interdisciplinary science course that meets the Laboratory Science course requirements.”

No Consensus

UC Riverside: “there is no UCR consensus on the ‘D’ admissions requirement”

Conditional Support:

UC Merced: The Merced Divisional Council supports the proposed change to the Area “d” requirement if implemented such that (1) standards for approval ensure that all Area “d” courses demonstrate significant instruction in fundamental principles of biology, chemistry, and/or physics regardless of the topical area, and (2) that the change does not negatively impact high schools. The Council is also in support of strongly encouraging students to take three years of science in high school.

Support:

UCSB: Two committees strongly endorsed; the admissions committee was divided.

"A-G Guide" Website

http://www.ucop.edu/a-gGuide/ag/a-g/science_reqs.html

(d) Laboratory Science

Two units (equivalent to two one-year courses) of laboratory science are required; three units are strongly recommended.

The intent of the laboratory science requirement is to ensure that entering freshmen have a minimum of one year of preparation in each of at least two of the areas of Physics, Chemistry, and Biology/Life Science. This requirement can be satisfied by taking two courses from among these specific subject areas, but courses from across the broad spectrum of scientific subjects are potentially acceptable, provided they conform to the Course Requirements specified below.

Goals of the Laboratory Science Requirement

The overarching goal of the subject requirement in Laboratory Science is to ensure that freshmen are adequately prepared to undertake university-level study in any scientific or science-related discipline. The term "laboratory" is intended to signify an empirical basis of the subject matter, as well as inclusion of a substantial experimental and/or observational activity in the course design. The requirement emphasizes Biology/Life Sciences, Chemistry, and Physics, because these subjects are preparatory to university-level study in all scientific and science-related disciplines. However, coverage of these foundational subjects in suitable breadth and depth can potentially be found in a wide range of science courses, provided the courses conform to the criteria described under the Course Requirements below.

All courses certified in the Laboratory Science subject area should be designed with the explicit intention of developing and encouraging these scientific habits of mind:

1. Students should develop a perception of science as a way of understanding the world around them, not as a collection of theories and definitions to be memorized.
2. Students should emerge from high school embracing an ease in using their scientific knowledge to perceive patterns and regularity, make predictions, and test those predictions against evidence and reason.
3. Students should recognize that abstraction and generalization are important sources of the power of science.
4. Students should understand that scientific models are useful as representations of phenomena in the physical world. They should appreciate that models and theories are valuable only when vigorously tested against observation.
5. Students should understand that assertions require justification based on evidence and logic, and should develop an ability to supply appropriate justifications for their assertions. They should habitually ask "why?" and "how do I know?"
6. Students should develop and maintain an openness to using technological tools appropriately, including graphing calculators and computers, in gathering and analyzing data. They should be aware of the limitations of these tools, and should be capable of effectively using them while making sound judgments about when such tools are and are not useful.
7. Students should recognize that measurements and observations are subject to variability and error, and that these must be accounted for in a quantitative way when assessing the relationship between observation and theory.

Course Requirements

Regardless of the scientific subject, all approved courses are expected to satisfy these criteria:

1. Courses should be consistent with the Goals described above.
2. Courses must explain the relevant phenomena on the basis of the underlying biological, chemical, and/or physical principles, as appropriate. They should provide rigorous, in-depth treatments of the conceptual foundations of the scientific subject studied.
3. Courses should afford students opportunities to participate in all phases of the scientific process, including formulation of well-posed scientific questions and hypotheses, design of experiments and/or data collection strategies, analysis of data, and drawing of conclusions. They should also require students to discuss scientific ideas with other students and to write clearly and coherently on scientific topics.
4. Courses must specify, at a minimum, **elementary algebra as a prerequisite or co-requisite**, and should employ quantitative reasoning and methods wherever appropriate.
5. Courses must take an overall approach that is consistent with the scientific method in relation to observing, forming hypotheses, testing hypotheses through experimentation and/or further observation, and forming objective conclusions.
6. Courses must include hands-on scientific activities that are directly related to and support the other class work, and that involve inquiry, observation, analysis, and write-up. **These hands-on activities should account for at least 20% of class time, and should be itemized and described in the course description.**
7. The content for Physics, Chemistry, and Biology/Life Sciences courses in grades 9 through 12 will usually be drawn from the [Science Content Standards for California Public Schools \(pdf\)](#), and may, in some cases, also be drawn from the [California Career Technical Education Model Curriculum Standards \(pdf\)](#). While these standards can be a useful guide, coverage of all items in the standards is not necessary for the specific purpose of meeting the subject requirements for university admission. Likewise, simple coverage of all standards is not enough to assure course approval. For success in college, secondary science teachers should help students learn to assimilate the major ideas and principles that encompass the standards rather than explore the breadth of all the standards. More important than the topics covered, or even than the skills directly used in class, are the more general abilities and attitudes gained through the effort of mastering the course content. These general abilities and attitudes are described in the Goals section above.

Notes

1. There is no preferred order to the sequence of courses that cover the foundational subject areas.
2. Students who have successfully completed an approved three-year integrated-science sequence will have met the two-year "d" requirement as well as the one-year "g" elective requirement. Students electing to enroll in an integrated-science program (ISP) are strongly advised to complete the entire three-year sequence. In most cases, the first year of an integrated-science sequence fulfills only the "g" elective requirement; the second and third years of the sequence then fulfill the two-year "d" laboratory science requirement.
3. Online courses may be approved for credit toward the "d" requirement if they meet all the guidelines outlined above, including a supervised hands-on laboratory component comprising at least 20% of the course (e.g., UCCP courses).

UNIVERSITY OF CALIFORNIA, ACADEMIC SENATE

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July 20, 2010

**ROBERT POWELL
SENATE CHAIR, UC DAVIS
UNIVERSITY OF CALIFORNIA**

Re: Systemwide Review of Area 'd' laboratory science admission requirement

Dear Bob:

As you know, at the request of the Davis division, the Academic Senate reviewed a proposal to expand the Area 'd' laboratory science admission requirement to include earth, environmental and space science (EESS) courses. Based on the responses from the systemwide review, at its meeting on June 30, the Academic Council unanimously declined to expand the language of Area 'd' to specifically include EESS courses along with the fundamental sciences of biology, chemistry and physics. However, Council requested that BOARS examine whether it is desirable to expand the Area 'd' language in the Senate Regulations to include a description of alternative approaches that could meet the laboratory science requirement.

Council notes that BOARS already is working with high school teachers and UCOP to ensure the rigor of alternative science courses that prepare students for UC-level work and encourages the continuation of this effort.

Please do not hesitate to contact me if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Henry C. Powell", written over a horizontal line.

Henry C. Powell, Chair
Academic Council

Copy: Academic Council
Martha Winnacker, Academic Senate Executive Director
Eldridge Moores, Distinguished Professor Emeritus, UC Davis
Bruce Luyendyk, Professor, UC Santa Barbara



320 STEPHENS HALL
UNIVERSITY OF CALIFORNIA

May 20, 2010

HENRY POWELL
Chair, Academic Council

Subject: Proposal to expand the Area (d) laboratory science admission requirement to include Earth, Environmental, and Space Sciences (EESS)

Dear Harry,

On May 17, 2010, the Divisional Council (DivCo) of the Berkeley Division discussed the proposal cited in the subject line, informed by the comments of the divisional committees on Admissions, Enrollment and Preparatory Education (AEPE), and Educational Policy (CEP).

DivCo declined to endorse the proposal. We found the arguments articulated by CEP persuasive:

While there is disagreement within CEP as to whether Area D should be restricted to fundamental science courses in chemistry, physics, and biology, or else include integrative sciences, there was widespread agreement that most earth sciences courses taught in California high schools do not meet the criteria for satisfaction of the Area D requirement. Moreover, there are already mechanisms in place for exceptional courses that do meet the criteria to be included in the Area D list. Therefore there does not need to be any modification of the Area D language.

DivCo acknowledged that the inclusion of EESS in the Area d courses would catalyze the development of more rigorous EESS courses at the high school level. We agreed with AEPE:


The proponents argue that schools have little incentive to develop such rigorous EESS courses that could satisfy area "d" under the current structure, but that they would be more willing to develop such courses if EESS were listed explicitly along with biology, chemistry and physics. Since so few rigorous courses exist now, this appears to be something of a "chicken or egg"

question: should UC wait until sufficiently rigorous EESS courses exist before listing this field as part of area “d”, or should UC explicitly identify EESS as a scientific discipline similar to those already listed based on the assumption that high schools will then develop sufficiently rigorous courses? BOARS argues for the former. The proponents of the current proposal argue for the latter. In any event, AEPE believes that a strong EESS curriculum must build on the more reductionist sciences of biology, chemistry and physics. As such, AEPE does not support a proposal that could allow students to replace one of the current course options with EESS.

If the number of area “d” units remains at 2 (two years of laboratory science), AEPE does not support including EESS explicitly in the list of lab sciences. On the other hand, if the number of area “d” courses could be increased from 2 to 3 (something that has been considered and rejected by BOARS recently), AEPE would support the explicit identification of EESS courses as being among those that satisfy this three year requirement. However, even if EESS were to gain this “status,” the courses that would qualify for Area “d” would have to be more rigorous than most currently offered in high schools.

In sum, we agree with the position adopted by the Board of Admissions and Relations with Schools, and the University Committee on Educational Policy opposing the inclusion of EESS among courses satisfying the Area “d” requirement.

Sincerely,



Christopher Kutz
Chair, Berkeley Division of the Academic Senate
Professor of Law, Jurisprudence and Social Policy Program

Cc: George Johnson, Chair, Committee on Admissions, Enrollment, and Preparatory Education
Ignacio Navarrete, Chair, Committee on Educational Policy
Anita Ross, Senate Analyst, Committee on Admissions, Enrollment, and Preparatory Education
Elizabeth Wiley, Senate Analyst, Committee on Educational Policy



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June 28, 2010

HENRY POWELL, CHAIR

University of California
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Oakland, CA 94607

Re: Proposal to Expand the Area (d) Laboratory Science Admission Requirement to Include Earth, Environmental, and Space Sciences: BOARS Recommendation for Materials to Include in Packet of Information Sent to Campuses

The referenced proposal was forwarded to all Davis Division standing committees in addition to the Faculty Executive Committee in each school and college at UC Davis. Comments were received from the Undergraduate Council, Committee on Admissions and Enrollment, and the College of Letters and Sciences Faculty Executive Committee.

Some believe the earth science proposal should be supported as it is already in the "d" area category. In fact, the Davis Division Committee on Admissions and Enrollment agrees that the current policy language already appears to embrace certification of courses in other science subjects (including EESS subjects), provided that they engage basic science content at a sufficiently rigorous level. The Division concurs that earth science study includes timely and interesting topics; such as climate change and earthquakes, and may draw students into the sciences who might otherwise not be attracted. There is strong support for the notion that there is value in delivering college-preparatory basic science curricula in ways that students find interesting and engaging, e.g. by framing the material in the context of earth, environmental and space sciences (EESS) subject areas.

However, overall, the proposal was not supported. The primary concern echoed BOARS in that most earth science courses are not as rigorous as those in the traditional areas. There is concern that students would elect earth sciences simply as a way to avoid chemistry and physics while minimally satisfying the a-g requirements. One suggested compromise was offered by the Davis Division Undergraduate Council: "One novel suggestion was to craft the "d" requirement statement in such a way as to not specifically exclude appropriate Earth Science and integrative science courses. Perhaps the wording in the proposal could be simplified to "two years of laboratory science, one in a physical science and one in a life or biological science.""

Finally, there is a strong belief that the rationale for changing UC admissions policy should not be confined to simply encouraging high schools to innovate science curricula. This message could, and should be transmitted by UC in ways that do not require formal revision of admissions requirements.

Sincerely,

A handwritten signature in black ink, reading "R.L. Powell".

Robert L. Powell III, Chair
Davis Division of the Academic Senate and
Professor and Chair, Department of
Chemical Engineering and Materials Science
Professor, Food Science and Technology



Office of the Academic Senate
338 Aldrich Hall
Irvine, CA 92697-1325
(949) 824-2215 FAX

June 18, 2010

REVISED

Harry Powell, Chair, Academic Council
1111 Franklin Street, 12th Floor
Oakland, CA 94607-5200

RE: Senate Review of the Proposal to Expand Area (d) Laboratory Science Admission Requirement

At its meeting of June 1, 2010 the Senate Cabinet reviewed the proposal to expand the Area (d) Laboratory Science Admission Requirement. The Council on Undergraduate Admissions and Relations with Schools (CUARS) unanimously supported adding Earth, Environmental, and Space Sciences (EESS) to UC's area "d" laboratory science admissions requirement (see attached CUARS letter). The Council on Educational Policy also reviewed the proposal, and conditionally supported the proposal. CEP requested a revision of the current proposal that would specify learning outcomes of quantitative ESS courses that could be offered in the 10th, 11th, or 12th grades and would meet the Admissions "d" Requirement.

However, the majority of the Cabinet agreed with the argument presented by BOARS in its initial response to the Academic Council (Memo from Michael Brown, 11/30/05).

"2. A change in policy is not needed because it is already possible for ESS and other integrative science courses to be approved as fulfilling the 'd' requirement, if such courses are properly designed. In particular, such courses must present at least a core set of knowledge in one or more of biology, chemistry, and physics; or must be advanced courses that have approved courses in one of these core disciplines as prerequisite..."

The Cabinet agreed that the current policy is adequate, and recommended against including integrative science courses to the list. It might be beneficial to add a footnote that indicates that EESS and other courses oftentimes fulfill this requirement. The Cabinet also thought that it might be beneficial to increase the number of science courses required for admission. This, of course, would require a thorough examination of the potential consequences of such an increase. Requiring 3 instead of 2 science courses

would allow students to take other integrative science courses in addition to the current requirements in biology, chemistry, or physics.

The Irvine Division appreciates the opportunity to comment.

A handwritten signature in black ink, reading "Judith Stepan-Norris". The signature is written in a cursive style with a large, looping initial "J".

Judith Stepan-Norris, Senate Chair

C: Martha Kendall Winnacker, Executive Director, Academic Senate

June 9, 2010

**JUDY STEPAN NORRIS, CHAIR
ACADEMIC SENATE, IRVINE**

RE: Review of proposal to expand 'd' laboratory science admissions requirement

The Council on Undergraduate Admissions and Relations with Schools (CUARS) voted unanimously in support of adding Earth, Environmental and Space Sciences (EESS) to UC's area 'd' laboratory science admissions requirement.

CUARS agrees with most of the arguments that have been made in support of the proposal. Perhaps the dominant factor in our decision is that resource depletion, environmental degradation, and climate change are increasingly becoming the hard "facts of life" in the 21st century. It should be obvious to all that there will be an increasing demand for scientists trained in EESS, as well as an educated population and a cadre of knowledgeable experts in teaching, media, government, etc. It might be argued that the elimination of Earth Sciences from the "d" laboratory requirement in 2003-04 was inconsistent with the UC mission statement to "...contribute to the needs of a changing society."

CUARS agrees that there are many difficulties and problems that must be solved in order to implement the proposal, but the cost of not doing so may prove to be greater. Dr. Ellen Druffel, a Professor of Earth Systems Science at UCI, gave a presentation at a recent meeting of CUARS. Although UCI boasts one of the premier departments in Earth Sciences, UC policy is effectively inhibiting the recruitment of the best and brightest students into this field. When UC devalues an integrative science for lack of rigor, students, teachers, administrators, and parents listen.

Philosophically, it is difficult to disagree with the primacy of Physics, Chemistry, and Biology as the building blocks of integrative sciences, but it is less clear how this self-evident statement is pedagogically relevant. It is likely the case that rigorous instruction and exposure to an integrative science is as important for the development of scientific thought as instruction in the basics. For some students, EESS courses are more likely to provide a critical, engaging spark of scientific interest. "Integrative Science" has been pejoratively used by some as a designation to secondary, lesser disciplines. From a constructive viewpoint, the term implies a more synergistic, expansive view of science, demonstrating the necessity of integrating knowledge from different fields, a skill just as important as the basics. A pure concentration in physics, chemistry, and biology without exposure to how these tools are used in a broader sense might actually constitute inadequate preparation for scientific inquiry in the 21st century.

Opponents to the proposal often state that the inclusion of EESS courses in the “d” requirement will yield students that are unprepared for the educational demands of UC. CUARS believes that this is a false argument. In order to fulfill admission requirements, all high school courses are vetted by UCOP. Some EESS courses, perhaps the majority at present, do not meet this standard, just as some biology and chemistry courses are not on the approved list. An approving nod from UC would inevitably lead to the gradual development of better textbooks and rigorous coursework. If the proposal is adopted, there will no doubt be an uneven development and distribution of approved EESS courses across California high schools, but momentary inequities should be accepted as start-up costs.

Sincerely yours,

Bruce Berg, Chair
Council on Undergraduate Admissions and
Relations with Schools



ACADEMIC SENATE EXECUTIVE OFFICE
LOS ANGELES DIVISION
3125 MURPHY HALL
LOS ANGELES, CA 90095-1408

PHONE: (310) 825-3851
FAX: (310) 206-5273

June 21, 2010

Henry Powell
Chair, Academic Council

In Re: UCLA Response to Proposal to Expand the Area "D" Admission Requirement

Dear Harry,

Thank you for the opportunity to review and opine upon the Proposal to Expand the Area "D" Laboratory Science Admission Requirement to Include Earth, Environmental, and Space Sciences (EESS). Upon receipt of the proposal, I requested review by the Undergraduate Council (UgC), the Committee on Undergraduate Admissions & Relations with Schools (CUARS), and the College FEC. All other committees were welcome to opine. I am attaching the responses received, for your information.

The UCLA Senate very much appreciates the value of educating California high school students in EESS fields. The Senate Executive Board, which speaks for the UCLA Senate on such matters, views these areas of study as beneficial to students who reside in a state constantly encountering environmental challenges, many of which could be covered in EESS courses. Although the Executive Board supports many fundamental parts of the proposal, we do not believe that the proposed expansion of the Area "D" requirement to include EESS courses represents the UC's best option in improving science education.

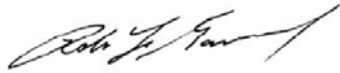
The Executive Board agrees with the argument that the education offered to the future state leaders should include EESS topics. Yet the Board, like UCLA's Undergraduate Council, was not convinced that this education should necessarily occur at the high school level, especially not in lieu of any foundational subjects such as biology, chemistry, or physics, as are currently part of Area D. If the UC truly believes that EESS topics are essential to one's becoming a scientifically educated member of the community, then these types of EESS courses should become part of a general education requirement on the UC campuses, if they are not already such. The duty should not fall upon California high schools, which may or may not have the resources to implement such topics of study, to provide EESS offerings. It was noted by several members that while it may be seen as a bonus to offer such courses beginning in high school, the reality is that many U.S. students are not exposed to a wide array of disciplines until their college years, and many U.S. high schools cannot afford to offer such a wide array of fields.

Beyond the additional costs associated with offering EESS courses in high schools, concerns were expressed among the Board members regarding the practical implementation of such a requirement in California high schools. Maintaining the rigor and quality of these courses, as would be necessary if they were to qualify under an Area "D" admissions subject, would require that teachers knowledgeable in these areas of study be hired by the high schools. Given the financial realities of the California public

education system as well as the relative dearth of secondary school educators with appropriate backgrounds in environmental science, geology, space sciences, and related areas, the Board feels that it would be unfair to impose this type of requirement on the high schools. The Board commends the secondary schools that currently have the resources to offer EESS courses under Area "D" by petition, and encourages these schools to continue to do so.

Again, thank you for the opportunity to review and opine upon this important proposal. Please do not hesitate to contact me should you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Robin L. Garrell", with a stylized flourish at the end.

Robin L. Garrell
Chair, UCLA Academic Senate

Cc: Martha Kendall Winnacker, Executive Director, Systemwide Senate
Jaime R. Balboa, CAO, UCLA Academic Senate

June 4, 2010

Robin Garrell
Chair, Academic Senate

RE: Area "D" Admissions Requirement

Dear Robin:

The Undergraduate Council reviewed the Area "D" Admissions Requirement at its meeting on May 14, 2010 and members were asked to return the spreadsheet that you provided to indicate agreement, conditional agreement, disagreement, or no comment on each of the recommendations.

Professor Darnell Hunt, CUARS Chair and UgC ex-officio member, briefed the Council on the proposal and the pros and the cons that the revisions presents. The proposal expands the Area "D" laboratory science admission requirement to include Earth, Environmental, and Space Sciences.

Proponents of the ESS proposal argued that:

1. Earth and space science (ESS) should be treated by UC in a co-equal fashion with biology, chemistry, and physics as a laboratory science because a command of ESS knowledge is an important element of scientific literacy, particularly in a seismically active state like California.
2. ESS is a distinctive field and a highly engaging one that would stimulate high school students' interest in scientific fields of study.
3. The current UC "D" eligibility requirement (a) is not consistent with the National Academic of Sciences K-12 science education standards for achieving the goal of science literacy; (b) does not provide enough encouragement or incentive to high schools to offer earth and space science courses; and (c) ignores a possible doorway to expanding interest in science.
4. A number of highly respected figures in the scientific community, including the current president of the National Academy of Sciences, support his position and the argue UC's current science requirements do not promote a strong science preparation in the high schools.
5. An integrative science such as ESS could be an important conduit to scientific fields of study at the University, especially for women and racial/ethnic minorities.
6. The "special status" enjoyed by biology, chemistry, and physics is archaic, and is the result of historical accident.

BOARS and UCEP were unanimous in expressing value for more ESS and other "integrated science" curricula in the high schools; however, both committees recommended that no change be made to the current "D" eligibility requirement.

BOARS and UCEP argued as follows:

1. The central purpose of eligibility requirements is to ensure minimum preparedness for academic success at the University. It is abundantly clear that the prevailing curricular philosophy at UC

holds that biology, chemistry, and physics, as appropriate, are foundational subjects for further study in any science-related field. Baccalaureate degree programs in science and science-related majors at UC overwhelmingly include introductory sequences of courses in biology, chemistry, and physics as part of their lower-division requirements. The same is not true for ESS courses. It would be unwise to change the "D" requirement in any manner that would result in lower levels of preparation in biology, chemistry, and physics among entering freshmen.

2. A change in policy is not needed because it is already possible for ESS and other integrative science courses to be approved as fulfilling the "D" requirement, if such courses are properly designed.
3. There is no agreement among UC faculty that ESS is "co-equal" with biology, chemistry, and physics. There is agreement that ESS courses that would not be approved under the current "D" requirement are NOT "co-equal" with UC-approved biology, chemistry, and physics courses.

It was noted that this proposal was discussed at the College FEC and the argument was presented there that not all high school students are preparing to pursue science at the college level, or professionally; therefore, this additional option would be beneficial to these students.

Also, some members also felt that adding ESS as a "D" requirement would provide an incentive for the high schools to develop stronger courses in these areas; there is currently no incentive, as the classes do not count. This argument was countered, however, by stating that the resources used to strengthen these courses would likely be pulled from other foundational science courses; thus weakening the other programs.

The Council believed that accepting ESS as a third science was acceptable; however, it should not fill one of the two science requirements. The Council was also supportive of developing an AP Course which would allow for college credit in ESS.

The motion to endorse UC Davis' proposal to expand the Area "D" laboratory science admission requirement to include Earth, Environmental, and Space Sciences was seconded. The faculty voted 1 in favor, 13 against, 0 abstentions; student vote: 0 in favor, 2 against, 0 opposed.

Sincerely,



Joseph B. Watson, Ph.D.
Chair, Undergraduate Council

cc: Michael Goldstein, Immediate Past Chair, Academic Senate
Ann Karagozian, Vice Chair, Academic Senate
Jaime Balboa, Chief Administrative Officer, Academic Senate
Linda Mohr, Assistant Chief Administrative Officer, Academic Senate
Judith Lacertosa, Principal Policy Analyst, Undergraduate Council
Dorothy Ayer, Assistant to Senate Leadership & CAO

June 4, 2010

To: Robin L. Garrell
Chair, UCLA Academic Senate

From: Darnell Hunt
Chair, UCLA Committee on Undergraduate Admissions & Relations with Schools

Re: Senate Item for Review: Area “D” Admissions Requirement

I am writing to report that at its meeting on May 21, 2010, the Committee on Undergraduate Admissions & Relations with Schools (CUARS) thoughtfully considered the proposed expansion of the *Area “D” Admissions Requirement*, to include Earth, Environmental, and Space Sciences. The committee voted to endorse the proposal, contingent upon the revisions below with 4 in favor, 1 opposed, and 0 abstentions. The student vote was 1 in favor, 0 opposed, and 0 abstentions.

CUARS feels strongly that courses in biology, chemistry, and physics should not be displaced by earth, environmental, and space sciences (EESS) courses, as the former, more foundational courses are necessary for proper college preparation. While CUARS agrees that not all students will enter science disciplines in college, or as a career path, the committee affirms the belief that no student should be admitted to a UC campus unprepared to pursue any degree program offered on that campus; that is, incoming students should be prepared in the event they discover areas of study they were originally not planning to pursue. The committee feels strongly that incoming students should not be “tracked” into non-science-oriented majors due to an expanded Area “D” requirement that has the potential to decrease the number of the more foundational science courses students take.

Nonetheless, the committee was persuaded by the proposal’s argument that EESS courses would appeal to students who otherwise may be disinterested in science, particularly those from disadvantaged backgrounds. The committee also was impressed by the proposal’s argument that students who take EESS courses may become more interested in science because of the courses’ high degree of relevance to students’ lives, thereby encouraging students to take additional science courses. Finally, the committee recognizes the potential positive effect that expanding the requirement could have as an incentive for high schools to improve the courses they currently offer in earth, environment, and space sciences. It is for these reasons that the committee ultimately supports the idea of expanding the Area “D” requirement to include EESS courses, but only under the conditions outlined below.

Currently the proposed revision to the UC Area “D” requirement stipulates: ... “two and preferably three courses (from at least two areas), of the following sciences: 1) biology, 2) chemistry, 3) physics, and 4) earth, environmental, and space sciences.” CUARS feels that the number of required courses should be raised to three -- a compromise that addresses the committee’s goal of not lowering the required number of foundational science courses *and* encouraging otherwise reluctant students to become more engaged with science. CUARS’ suggested revision would therefore state: ... **“three and preferably four**

courses (from at least **three** areas) of the following sciences: 1) biology, 2) chemistry, 3) physics, and 4) earth, environmental, and space sciences.” However, the implementation of this new requirement should be contingent upon schools offering sufficient access to three of these four courses. CUARS is sensitive to the possibility that such an expansion could have an unintended, negative impact on disadvantaged and underrepresented students who attend under-resourced high schools. Every precaution should be taken to ensure that does not happen, which may warrant additional research before expansion of the area is implemented.

CUARS would also like reassurances that all EESS courses accepted for the Area “D” requirement are subject to the same review process as the biology, chemistry, and physics courses currently within the area. Maintaining quality of courses is essential, as there appears to be considerable variation in the scope and rigor of EESS courses currently offered in the state. Finally, the committee acknowledged that it was unlikely under-resourced schools would be able to react as quickly as others to any expansion of the area, and that this reality should be taken into account in any schedule for implementing the new requirement.

If you have any questions or need additional information, please feel free to contact me (x64304; dhunt@soc.ucla.edu), or Dottie Ayer (x62070; dayer@senate.ucla.edu).


cc: Jaime Balboa, Academic Senate CAO
Linda Mohr, Academic Senate Assistant CAO
Judith Lacertosa, CUARS Analyst
Dottie Ayer, Academic Senate

UCLA MEMORANDUM

College Faculty Executive Committee
A265 Murphy Hall

May 20, 2010

To: Robin Garrell, Chair
UCLA Academic Senate

From: Ray Knapp, Chair 
UCLA College Faculty Executive Committee

Re: College FEC response to “Systemwide Review of Proposal to Expand the Area (d) Laboratory Science Admission Requirement to Include Earth, Environmental, and Space Sciences: BOARS Recommendation for Materials to Include in Packet of Information Sent to Campuses”

The College Faculty Executive Committee (FEC) reviewed the above proposal at its May 14, 2010 meeting. After careful review, discussion, and consultation with Ray Ingersoll from the Department of Earth and Space Sciences and other science faculty on the FEC, the FEC has unanimously endorsed UC Davis’ proposal to expand the Area “d” laboratory science admissions requirement to include Earth, Environmental, and Space Sciences.

Proponents of the proposal have convincingly argued that inclusion of EESS courses under Area “d” will promote science literacy, engage and stimulate high school students’ interest in the sciences, and incentivize high schools to offer rigorous EESS courses. When designed appropriately, EESS courses can provide sufficient foundational support for further study in any science-related field. This also seems a timely initiative, given the growing emphasis on the environment and sustainability.

The FEC believed that several of BOARS’ concerns could be addressed by adding language to the a-g literature advising aspiring science majors to take biology, chemistry, and physics courses as preparation for an undergraduate program in the sciences. BOARS’ remaining concerns about the rigor of EESS courses could be addressed by clearly articulating and delineating expectations for EESS courses, much in the same way they do now for current high school sciences courses.

The College FEC appreciates the consultative process and opportunity to provide feedback on this proposal. You are welcome to contact me at (310) 206-2278 or knapp@humnet.ucla.edu with questions. Kyle Stewart McJunkin, Interim FEC Coordinator, is also available to assist you and he can be reached at (310) 825-3223 or kmcjunkin@college.ucla.edu.

cc: Lucy Blackmar
Penny Hein-Unruh
Judith Lacertosa
Linda Mohr
Joseph Watson

UNIVERSITY OF CALIFORNIA, MERCED

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SANTA BARBARA • SANTA CRUZ

OFFICE OF THE ACADEMIC SENATE
MARTHA CONKLIN, CHAIR
mconklin@ucmerced.edu

UNIVERSITY OF CALIFORNIA, MERCED
5200 NORTH LAKE ROAD
MERCED, CA 95343
(209) 228-7954; fax (209) 228-7955

June 3, 2010

HENRY C. POWELL
CHAIR, ACADEMIC COUNCIL

**Re: Systemwide Review of the Proposal to Expand the Area (d) Laboratory Science
Admission Requirement to Include Earth, Environmental, and Space Sciences**

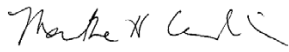
Dear Harry:

The Merced Division welcomes this opportunity to comment on the proposal to expand the Area (d) Laboratory Science Admission Requirement to Include Earth, Environmental, and Space Sciences. The proposal was distributed to standing committees and the Schools Curriculum committees. We received comments on the proposal from the Merced Division Undergraduate Council (attached), a memo from a group of faculty supporting the proposed change (attached) and from the Natural Sciences Curriculum Committee (attached).

In their discussion, the Undergraduate Council did not reach consensus regarding the proposed change. The Council agreed that Area "d" courses need to teach basic principles of scientific method and practice, but disagreed about whether the current requirement was adequate. A group of Academic Senate members (which includes the Dean of Natural Sciences and the Dean of Graduate Studies) have expressed support for the change (see attached memo and list). Faculty commented on the importance and value of both maintaining rigor in the Area "d" requirement and expanding the scope of subjects taught in Area "d" to include EESS courses.

The Merced Divisional Council supports the proposed change to the Area “d” requirement if implemented such that (1) standards for approval ensure that all Area “d” courses demonstrate significant instruction in fundamental principles of biology, chemistry, and/or physics regardless of the topical area, and (2) that the change does not negatively impact high schools. The Council is also in support of strongly encouraging students to take three years of science in high school.

Sincerely,

A handwritten signature in cursive script, appearing to read "Martha H. Conklin".

Martha H. Conklin, Chair

cc: Martha Winnacker, UC Academic Senate Executive Director
Divisional Council
Senate Office

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SANTA BARBARA • SANTA CRUZ

ACADEMIC SENATE, MERCED DIVISION
UNDERGRADUATE COUNCIL (UGC)
SUSAN AMUSSEN, CHAIR
samussen@ucmerced.edu

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MERCED, CA 95344
(209) 228-7930; fax (209) 228-7955

May 18, 2010

To: Martha Conklin, Chair, Division Council

From: Susan Amussen, Chair, Undergraduate Council

Re: BOARS Area "d" Requirement

UGC discussed the proposal to revise the area d requirement to incorporate EESS courses. UGC did not come to any consensus. There was consensus that the current phrasing - that high school science courses need to provide grounding in basic principles of scientific method and practice, was indeed appropriate. The committee disagreed as to whether the current practice, which allows the approval of EESS courses, was adequate. Some believed that the focus on the core disciplines was appropriate, while others thought that changing the language would stimulate more rigorous EESS courses that would both serve crucial public interests and provide appropriate preparation for UC science courses.

cc: Undergraduate Council
Division Council
Senate Office



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MERCED, CALIFORNIA 95343
(209) 228-4400
FAX: (209) 228-4424

Peggy A. O'Day
Professor, School of Natural Sciences
(209) 228-4338
EMAIL: poday@ucmerced.edu

May 17, 2010

To: UC Merced Divisional Council

From: Peggy O'Day, School of Natural Sciences

Re: Systemwide Review of Proposal to Expand the Area (d) Laboratory Science Admission Requirement to Include Earth, Environmental, and Space Sciences

Attached is a list of UC Merced faculty who expressed support of the petition circulated among the UC campuses in February 2008 to change the Area (d) Laboratory Science Admission Requirement to include Earth, Environmental, and Space Sciences, and a list of faculty who either re-affirmed their support of this proposed change in May, 2010 or new faculty who have indicated their support (a number of whom were not yet on our faculty in February 2008). Also included in the attached document are comments received from faculty in May 2010.

As you can see from the list, the number of faculty in support of this proposed change represents a significant fraction of UC Merced Academic Senate faculty. For reasons described in the Moores-Luyendyk proposed, many faculty at Merced view this proposal as a positive change for UC that would enhance broader scientific literacy among high school students. Faculty expect that any change to the UC Area (d) requirement would be formulated according to academic standards that meet the rigor in science fundamentals and quantitative reasoning of the current Area (d) requirement. Given that national (National Academy of Science/National Research Council, American Association for the Advancement of Science, and Council of Scientific Society Presidents) and state standards have been formulated for biology, chemistry, and physics fundamentals that can be taught in the context of Earth, Environmental, and Space sciences, revision of the Area (d) requirement and course review need not be burdensome. Furthermore, the proposed change allows the option of including such courses in the curriculum, but does not require it of high schools, and thus there is no negative impact on schools.

We urge the UC Merced Division leadership to consider the merits of this proposed change, and to call on BOARS to undertake a revision of the Area (d) admission requirement to broaden and update it to reflect science of the 21st century.

Name	Unit	Supported Petition 02/2008	Supported Proposal 05/2010
David Ardell	School of Natural Sciences		X
Miriam Barlow	School of Natural Sciences	X	
Michael Beman	School of Natural Sciences		X
Eric Berlow	School of Natural Sciences	X	X
Hans Bjornsson	Vice Provost for Academic Planning		X
Elliot Campbell	School of Engineering		X
Yihsu Chen	Schools of Engineering and Social Science, Humanities & Arts	X	
Jinah Choi	School of Natural Sciences	X	X
Carlos Coimbra	School of Engineering		X
Michael Dawson	School of Natural Sciences	X	X
Benoit Dayrat	School of Natural Sciences	X	
Robin DeLugan	School of Social Science, Humanities & Arts		X
Carolin Frank	School of Natural Sciences		X
Henry Forman	School of Natural Sciences	X	X
Teamrat Ghezzehei	School of Natural Sciences		X
Stephen Hart	School of Natural Sciences		X
Kathleen Hull	School of Social Science, Humanities & Arts	X	
Christopher Kello	School of Social Science, Humanities & Arts		X
Lara Kueppers	School of Natural Sciences	X	X
Monica Media	School of Natural Sciences	X	X
Ruth Mostern	School of Social Science, Humanities & Arts	X	X
Peggy O'Day	School of Natural Sciences	X	X
Rudy Ortiz	School of Natural Sciences	X	X
Maria Pallavicini	School of Natural Sciences	X	X
Jason Raymond	School of Natural Sciences	X	
	Schools of Engineering and Engineering; Vice Chancellor for Research and Dean of		
Samual Traina	Graduate Studies	X	X
Wil van Breugel	School of Natural Sciences	X	
Roger Bales	School of Engineering	X	X
Maritha Conklin	School of Engineering	X	X
Qinghua Guo	School of Engineering	X	
Thomas Harmon	School of Engineering	X	X
Valerie Leppert	School of Engineering	X	X
Wolfgang Rogge	School of Engineering	X	
Christopher Viney	School of Engineering	X	
	Schools of Engineering and Social Science,		
Anthony Westerling	Humanities & Arts	X	
Jeff Wright	School of Engineering	X	

Faculty Comments (May 2010)

I firmly support this, especially because teaching Earth, environmental and space sciences in the more rigorous "d" context makes it clear that these are physical and biological areas of discovery, whereas the electives (with fewer restrictions) may focus more on "issues" than scientific principles.

I definitely support this petition and encourage that any science courses that have a quantitative emphasis to them also count for area "d" requirements. While I can't speak to the chemistry and physics, I can say that high school students taking biology are no better prepared for UC-level science than any other student entering as evidenced by the poor performances of freshmen in Intro biology (BIO 1) and Math. To say that students at a high school level will be any less prepared b/c they took EESS courses than those taking biology, chemistry or physics is incorrect gauging from what I see in my class.

My position in teaching introductory molecular biology is that it is precisely the standard of area D — preparation for introductory college science courses — that would make addition of EECS to the standard appropriate. Incoming students need better training in quantitative reasoning about scales of phenomena outside everyday experience, and basics like the metric system, working with exponents, scientific notation, basic concepts of models and modelling etc. I really don't see why these fundamental precepts couldn't be taught especially well in the context of EECS. Furthermore, fundamentals of physics, chemistry and biology can be taught in the context of EECS. I certainly support that EECS be added to area D.

As long as UC oversees to make sure that content of EESS courses has significant content in the fundamentals of biology, chemistry, or physics, which any EESS course worth its weight will have, I do not see what the issue is. EESS courses should provide as strong a basis for success in UC science classes as any of these more traditional subjects (and they might be more interesting to the students too).

I am in favor of this petition. We have too many students thinking biology is their only option.

From: Patti Liwang [mailto:pliwang@ucmerced.edu]
Sent: Wednesday, May 19, 2010 12:14 PM
To: Fatima Paul
Subject: Re: System wide Review - Area "d" admissions requirement
Importance: High

Dear Fatima,

The Natural Science Curriculum Committee has considered this issue. While the majority of the committee is against the expansion of the lab requirement, we could not reach a unanimous consensus.

Thanks,
Patti

On May 13, 2010, at 11:24 AM, Fatima Paul wrote:

**UNDERGRADUATE COUNCIL
CHAIRS OF THE SCHOOLS CURRICULUM COMMITTEES
CHAIR OF THE ES GRADUATE GROUP**

On Behalf of Senate Chair Martha Conklin:

Attached for your review is a proposal to expand the Area "d" laboratory science admissions requirement to include courses in Earth, Environmental and Space Sciences.

This review was originally requested by the Davis division. The Academic Council referred it to BOARS for study. Although the BOARS report recommended against the proposed change, the Academic Council voted to submit the proposal for Senate review. In preparation for the review, Council asked BOARS and a member of Council who favored the proposal to assemble a packet of material to facilitate the review. That material is attached to the enclosed letter from BOARS to Council Chair Powell.

As the Senate's designated authority on admissions requirements, BOARS will be asked to assess the comment that results from this review and make a final recommendation to Council.

Please submit your comments to fpaul@ucmerced.edu by **Friday, May 21, 2010**. As always, if you feel that the issue is not within your purview, you may decline to comment.

Best Regards,

Fatima Paul
Senior Senate Analyst
Academic Senate, Merced Division
Tel: 209-228-7930
Fax: 209-228-7955



CHAIR, ACADEMIC SENATE
RIVERSIDE DIVISION
UNIVERSITY COLLEGE BUILDING, RM 225

ANTHONY W. NORMAN
DISTINGUISHED PROFESSOR OF BIOCHEMISTRY
AND BIOMEDICAL SCIENCES
RIVERSIDE, CA 92521-0217
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June 15, 2010

Harry C. Powell
Professor of Pathology
Chair, UC Systemwide Academic Senate
1111 Franklin St., 12th Floor
Oakland, CA 94607

Dear Harry:

**RE: REVIEW OF THE PROPOSAL TO EXPAND THE AREA "D" ADMISSIONS
REQUIREMENT**

The review of the proposal to expand the Area "d" laboratory science admissions requirement to include courses in Earth, Environmental and Space Sciences was reviewed by our College of Natural and Agricultural Sciences Executive Committee, Educational Policy and Undergraduate Admissions. Needless to say, there was no consensus amongst the three committees, and so I will instead list below, the comments from each Committee.

CNAS Executive Committee:

The Committee agrees with the BOARS recommendation that the area "d" requirement not be expanded as proposed. The Committee members feel very strongly that students will be best prepared for science courses at the university level if they have a strong foundation of basic science courses in high school (e.g., biology, chemistry, and/or physics). Courses such as earth, environmental, and space sciences are certainly valuable, and the CNAS Executive Committee would be in favor of expanding the number of science courses required to be admitted to UC and including these courses in addition to the current requirements. However, it is our strongly held view that these courses would not prepare students as well for the courses they will take at the university as will the currently required area "d" courses. The CNAS Executive Committee is unanimous in its opposition to the proposal to expand the area "d" requirement to include earth, environmental, and space sciences.

Undergraduate Admissions:

Most members of our committee supported the proposal in favor of expanding the Area "D" admissions requirement to include courses in Earth, Environmental, and Space sciences. However, two members offered no comment, and one agreed with the BOARS' recommendation to deny the proposal, thus I am reluctant to state that the committee was in favor of the proposal.

Supporters of the proposal were concerned with a perceived myopia of certain views, viz., that UC cannot compete academically with other public universities if we devalue early training in what

was characterized as “increasingly important fields of study across various national and international sectors.” Two members referred in various ways to the “caste hierarchy” of the “foundation sciences” vs. the “integrative sciences,” with EESS falling into the latter, lower echelon.

Dissent focused on concern that, important as exposure to EESS material may be, knowledge in these fields “does not substitute for biology, physics, or chemistry with regards to college preparation,” a situation noted in the BOARS report, wherein few UC chairs ranked ESS or Geology as important for preparation. Those who dissented noted that “a change in policy is not needed because it is already possible for ESS to be approved as fulfilling the ‘d’ requirement, if such courses are properly designed.” The approved-course database contains many examples of high school courses certified in the ‘d’ subject area that are not specifically in biology, chemistry, or physics, including courses in ESS subjects.

One member commented at length and offered new language that would emphasize the need for “any science major “ to have a strong foundation in the big three of biology, chemistry, and physics, while enabling some latitude for inclusion of EESS courses. At the heart of this proposal is acknowledgement that as “more than half of the students who enter UC do not major in science or engineering, an integrative science course is likely to serve these students better.” For the majority of students graduating from UC, “the need to have an understanding of ‘how the world works’ is more important: all politicians, lawyers, elementary school teachers, business people, artists, sociologists, and philosophers should have a basic understanding of *real-world, applied* chemistry, physics, and biology” and the integrative sciences do an excellent job of providing this broad, integrated science foundation. In this view, EESS courses can be the motivation for students to pursue the non-integrative courses in the triumvirate. The argument was made that a course in earth science is more likely to get a student interested in chemistry or physics than the reverse. For these reasons, the committee member suggested that the “d” requirement be modified to include Earth, Environmental, and Space Sciences but with the following wording:

...two and preferably three courses (from at least two areas), of the following sciences: 1) biology, 2) chemistry, 3) physics, and 4) Earth, environmental, and space sciences.
Students interested in a science or engineering degree are strongly recommended to take two and preferably three courses (from at least two areas), of the following sciences 1) biology, 2) chemistry, and 3) physics

Although our committee did not reach consensus on this matter, the majority of members would urge some consideration of language such as that above.

Educational Policy:

The Committee on Educational Policy discussed the proposed change to the UC admissions requirements, section 'd'. The Committee was unable to reach a consensus opinion on this issue due to the realization that the proposed changes will affect students in different ways depending on their individual circumstances.

If adopted, the proposed modification would allow students to satisfy all laboratory science entrance requirements without taking a basic science course in high school. The Committee is concerned that this would lead to more students having difficulty in dealing with the introductory science courses in their freshman year, increased attrition and/or enrollment in remedial courses, and possibly an increase in the time to graduation. The CEP was uneasy about the possible lack of

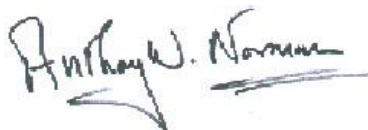
rigor in the ESS courses, though the sample courses (currently used by students to satisfy the 'g' requirement) reach the necessary level, the Committee was uncertain about the standards these courses will be required to meet; though the proposal points out the existence of standards created by the National Academy of Sciences, there are no state standards in the ESS areas and there is no clear mechanism by which the NAS standards will be required in California courses.

On the other hand, the Committee readily recognizes that the added flexibility might attract some students to the sciences and can benefit the large section of students who will not be pursuing careers in the sciences. The Committee also recognizes that the ESS courses can motivate students by providing real-life examples that illustrate the importance of basic science in our society. It is also worth noting that students interested in science are best advised to take the basic science courses in high school, but it is also true that high school students need not know their main area of interests at the time they are fulfilling their laboratory science requirements.

The usefulness of the proposed modification to the students will then depend crucially on the advice they receive as they contemplate the options presented. However, the current budgetary cuts have decimated the number of high school advisors, and this will necessarily lead to a lack of individualized advice. If this situation is perpetuated, the addition of ESS courses as options might increase the likelihood that students will not choose the courses best suited to their interests and abilities. The CEP noted that the University can partly remedy the advisor deficiency by allowing college-specific admission requirements, recognizing that this will require a more involved review of the student applications, together with a prolonged outreach effort to insure such changes are assimilated by high school students and administrations.

So in summary, there is no UCR consensus on the 'D' admissions requirement. There is not a simple answer here, and it is my personal view that there is not a satisfactory way to mandate the 'D' requirement option at this time.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Anthony W. Norman". The signature is fluid and cursive, with a horizontal line underneath the name.

Anthony W. Norman
Distinguished Professor of Biochemistry and
Biomedical Sciences; and
Chair of the Riverside Division

CC: Martha Kendall Winnacker, Executive Director of the Academic Senate
Sellyna Ehlers, Director of UCR Academic Senate office



ACADEMIC SENATE
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Joel Michaelsen, Chair
Deborah Karoff, Executive Director

June 11, 2010

Henry Powell, Chair
Academic Senate

RE: Proposal to Expand the Area (d) Laboratory Science Admission Requirement to Include Earth, Environmental and Space Sciences

Dear Henry,

In the Santa Barbara Division, three groups reviewed the Proposal to Expand the Area (d) Laboratory Science Admission Requirement to Include Earth, Environmental, and Space Sciences: the Committee on Admissions, Enrollment and Relations with Schools (CAERS) which is a sub-committee of the Undergraduate Council, the Letters and Science Faculty Executive Committee (L&S FEC) and the College of Creative Studies Faculty Executive Committee (CCS FEC).

The two Faculty Executive Committees (L&S and CCS) strongly endorsed the proposal to expand Area d. The L&S FEC believes that "exposing California high school students to earth science principles is as valuable as other traditionally accepted fields (i.e., biology, chemistry and physics)." In addition, given the expectation that EESS courses will have the same rigor as the more traditional science courses convinces them that "EESS courses would not be used as a pathway to a less rigorous scientific preparation for UC-bound students."

CAERS found themselves divided about the question with some members believing that the EESS courses represent a different kind of science that is important to scientific inquiry especially in the context of current environmental and world problems. Other members believe that Biology, Physics and Chemistry are foundational disciplines and that EESS courses are related to those disciplines, but not in the same fundamental way. In addition, these members were concerned about the overall rigor of EESS courses at the high school level.

Thank you for opportunity to comment.

Sincerely,

A handwritten signature in cursive script, reading "Joel Michaelsen".

Joel Michaelsen, Chair
Santa Barbara Division



1156 HIGH STREET
SANTA CRUZ, CALIFORNIA 95064

Office of the Academic Senate
SANTA CRUZ DIVISION
125 CLARK KERR HALL
(831) 459 - 2086

June 14, 2010

Henry Powell, Chair
Academic Council

RE: UCSC Response to Area “d” Admissions Requirement Changes

Dear Harry,

The Santa Cruz Division reviewed the proposal to expand Area “d,” laboratory science admissions requirement to include courses in Earth, Environmental and Space Sciences (EESS). Two committees submitted comments, Admissions and Financial Aid (CAFA) and Preparatory Education (CPE). Neither committee recommends expanding the Area “d” requirement to include EESS at this time. Despite general agreement of the importance of the EESS curriculum as part of the general education of California high school graduates, expanding the curriculum of Area “d” is not the right tool with which to address the issue.

Most existing high school EESS courses are not as rigorous as the physics, biology, and chemistry courses now called out in the Area “d” requirement. We feel that allowing them explicitly would be more likely to result in less-prepared entering freshmen than to encourage the schools to change or improve these courses. From the perspective of CPE, which is particularly sensitive to UC's mission to include students from all high-school backgrounds, we believe that the alternate plan of increasing the requirement to three laboratory science courses (rather than two required and three recommended) would disproportionately disadvantage students from the most poorly-funded schools.


We do think that it is possible to teach a course in EESS in as rigorous and demanding a fashion as an eligible Physics, Chemistry, and Biology course; however, it is our overwhelming view that Area “d” sciences should not only be rigorous but “fundamental,” that is, prepare students for further study of science at UC and that EESS does not meet this criteria. We note that some Earth and Space science courses are already approved to satisfy the Area “d” requirement but these specific courses include a significant amount of either Physics or Chemistry.

It was also our view that adding EESS to Area “d” would favor students who attend schools in relatively wealthier districts that might be able to have the resources to include EESS in their curriculum and this would exacerbate already existing inequities in our public school system and affect admissions to UC. Finally, a

change in the Area "d" requirement would upset the current alignment of requirements with the CSU system.

Schools that want to offer higher-level EESS courses to satisfy the Area "d" may now do so if the course is an advanced one that makes significant use of prerequisite material from the other sciences. Revising the wording of the admissions requirement document so that this option is more clearly presented to the high schools, perhaps even using EESS as an example, might go part way toward meeting the goals of the group led by Dr. Moores.

Sincerely,

A handwritten signature in black ink, appearing to read "Lori Kletzer", written in a cursive style.

Lori Kletzer, Chair
Academic Senate
Santa Cruz Division



OFFICE OF THE ACADEMIC SENATE

9500 GILMAN DRIVE
LA JOLLA, CALIFORNIA 92093-0002
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June 24, 2010

Professor Henry Powell
Chair, Academic Council
University of California
1111 Franklin Street, 12th Floor
Oakland, California 94607-5200

Subject: Proposal to Expand Area "D" Laboratory Science Admissions Requirement

Dear Harry,

In response to your request of March 23, the San Diego Division sought and received comment from the appropriate Divisional committees on the Proposal to Expand Area "D" Laboratory Science Admissions Requirement, and the Senate Council considered the proposal at its meeting on June 7, 2010. Reviewers found BOARS' arguments in opposition to the expansion proposal compelling and were supportive of BOARS' position.

Sincerely,

A handwritten signature in blue ink that reads "W S Hodgkiss".

William S. Hodgkiss, Chair
Academic Senate, San Diego Division

cc: Divisional Vice Chair Frank Powell
Executive Director Martha Winnacker



UNIVERSITY COMMITTEE ON EDUCATIONAL POLICY (UCEP)
Keith Williams, Chair
krwilliams@ucdavis.edu

Assembly of the Academic Senate
1111 Franklin Street, 12th Floor
Oakland, CA 94607-5200
Phone: (510) 987-9466
Fax: (510) 763-0309

June 23, 2010

Henry Powell, CHAIR
ACADEMIC COUNCIL

Re: Area “d” lab science admission requirements

Dear Harry,

UCEP discussed at the June meeting the proposed expansion of UC’s Laboratory Science (‘d’) admissions requirement to include earth, environmental and space sciences (EESS) that was put out for review by the Academic Council. We greatly appreciate the thoroughness of the documents compiled by BOARS concerning the current status and historical path of the proposal, and the input provided by EESS advocates. We believe that both BOARS and the originators of the Earth, Environmental, and Space Sciences (EESS) proposal, led by Professors Moores and Luyendyk, are trying to ensure that the laboratory science preparation required for students applying to UC is held to an appropriately high standard, while also offering options that allow students to prepare in the best way for their UC education. Advocacy for preparation in science is ultimately beneficial to the state as it leads to both highly prepared scientists graduating from UC and citizens who can better understand and appreciate local, statewide, and global issues influenced by science.

Rather than either endorsing the proposal from EESS or advocating maintaining the status quo, UCEP proposes consideration of a slightly different solution that we think can address many of the concerns raised in the various documents. We believe this alternative has the potential to open a more transparent pathway for science courses to be deemed acceptable for the area “d” requirement while still maintaining the expected scientific approach and content in the courses approved. After some comments on relevant issues, we will detail our proposal for consideration. We assume throughout this document that EESS courses being considered for inclusion as a laboratory lab science courses are ones that would meet the rigor specified for the laboratory science requirement as designated in the a-g Guide (<http://www.ucop.edu/doorways>) and would not include the type of 9th grade less rigorous courses sometimes used as an example for why a blanket approval of EESS courses is not desirable.

Any high school course of study that stimulates interest in the sciences is likely to be beneficial to California and its citizens. For students not drawn strongly to the fundamental courses in biology, physics and chemistry an appropriate course in EESS or other integrative areas where there is a closer association to key environmental, energy, or geological concerns might kindle an interest that will carry over to issues of public policy or advocacy for the environment, to efforts related to sustainable resources, or other areas where scientific understanding is beneficial. For students not intending science to be the cornerstone of their UC education, such an interest might be more beneficial than what would come by being compelled to take a course for which they have little affinity. While we do not intend to diminish the value of the

fundamental disciplines at the core of area “d”, we do believe there are other possibilities that can still meet the basic objective of preparing students for UC.

The crux of the differences between the current laboratory science admission criteria and the EESS proposal seem to reside in 1) a policy issue related to fundamental disciplines, and 2) in issues related to how acceptable courses are approved and identified within the area “d” admission criteria. In addition, there are differences in the perceived necessity of EESS to be listed among the science areas acceptable for area “d”.

Fundamental Disciplines

EESS advocates have proposed that EESS be listed as a fundamental discipline along with biology, chemistry and physics, and BOARS has countered that there is no agreement among UC faculty that EESS is co-equal with the current designations. In an email from Professor Moores to the Academic Council (June 10, 2010) he counters that there is also no agreement that it is not co-equal. BOARS also raises the concern that expanding the list to include EESS would put in question how to treat other “integrative” sciences (anthropology, engineering, psychology) or other science-related subject areas (e.g., computer science, geography). We tend to agree with BOARS that EESS or other integrative sciences should not specifically be identified along with biology, chemistry and physics in the fundamental discipline designation, but we propose below adding a statement that makes it more clear how other types of integrative or science-related subject area courses, such as those suggested by EESS, can be appropriate for area “d” requirements.

Approval of interdisciplinary area “d” courses

BOARS has also stated that there is an existing pathway for EESS or other appropriate lab science courses to qualify as area “d” courses, and their position has been that this means there is no need for a change in policy. EESS advocates agree that the existing “d” requirement allows the inclusion of EESS courses that are designed to meet the “d” criteria” (email from Professor Moores, June 10, 2010). However, Moores also cites the presence of only a few EESS approved area “d” courses as a deterrent to getting support for such classes from high school principals because they see the minimal course listings as evidence UC does not value courses in this area. This seems to be more an issue of presentation or marketing rather than a question of scientific merit. For this reason, UCEP suggests considering an alternative process by which alternative area “d” courses are more visibly acknowledged as being legitimate, and that there be an option to define a template in a more specific instructional area that would facilitate development of appropriate courses.

UCEP’s Proposal

UCEP suggests that the area “d” requirement in senate regulations be reworded with language similar to the following:

Revision to SR424.2.d

Laboratory science, 2 units, two years of laboratory science providing basic knowledge in at least two of the fundamental disciplines of biology, chemistry, and/or physics; alternatively one of the courses can alternatively be an approved interdisciplinary science course that meets the Laboratory Science course requirements.

The added statement above would make it clear that UC values courses outside the “fundamental” designation. “Interdisciplinary” is used here because that seems to be the category given to approved courses that do not meet the fundamental designation. “Integrative” or some similar term could be equally appropriate.

In addition, UCEP suggests that BOARS (or admissions requirements staff, as appropriate) work with

EESS advocates (or with other interdisciplinary groups) to develop specific templates that will help define specific content for integrative courses that would be acceptable as area “d” courses (i.e., ones that would meet the Laboratory Science course requirements). This would help identify specific course content in specific integrative areas that would be acceptable for an area “d” course, and it would allow high-school administrators to see more specifically what is needed for such a course. Courses submitted by high schools for approval that follow these templates would be presumed acceptable, though they would still be required to show how they fit within the local instructor and student circumstances, and would still be subject to the specific review process. Schools would still be free to propose alternative courses in any given integrative area if they desired a different course emphasis or alternative content, but approval for those courses would not have the same presumption of acceptability. Currently, the UC a-g website includes links to course descriptions for many courses that are both “standard” (presumably within the “fundamental” designation), and “innovative” (presumably non-fundamental courses) that meet (or do not meet) the laboratory science course requirements (http://www.ucop.edu/a-gGuide/ag/course_descriptions/welcome.html). These course descriptions are intended only as examples of acceptable courses, and the templates proposed here would be similar in purpose, to illustrate the content of a course that would be acceptable as an area “d” course. Having more specific templates could show high school administrators that UC does value such appropriately constructed integrative courses but would only minimally change the senate regulation language and would not create confusion regarding what should or should not be included in the fundamental area. This process might have some similarity to the C-ID process currently going on within the California Community College system where course descriptors identify minimal course content and learning objectives document the expectations for what is learned within a course.

BOARS is better versed in the admissions process than UCEP and will be better able to identify any weaknesses or inconsistencies in the proposal we have made, but we do see the two sides as not being too far apart. We believe that a compromise position that respects the epistemological roles of biology, physics, and chemistry, but encourages greater scientific literacy through integrative/interdisciplinary pedagogies, would be appropriate. Please contact us if we can provide any further information or clarification.

Sincerely,

A handwritten signature in black ink that reads "Keith R. Williams". The signature is fluid and cursive, with the first name "Keith" and last name "Williams" clearly legible.

Keith Williams, Chair
UCEP