



Chair, Academic Council and Assembly of the Academic Senate
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Faculty Representative to the Board of Regents
University of California
1111 Franklin Street, 12th Floor
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August 9, 2006

WYATT R. HUME
PROVOST AND EXECUTIVE VICE PRESIDENT-ACADEMIC AFFAIRS

Re: Proposed Joint Task Force – Guidance to High Schools on the ‘a-g’ Subject Requirement

Dear Rory,

At its July 26, 2006 meeting, the Academic Council approved a proposal of the Board of Admissions and Relations with Schools (BOARS) to form a joint Senate/Administrative task force for the revision of the ‘a-g’ subject requirement guidelines. The work of the task force would be to re-evaluate and recommend revisions to the material that provides clarification and direction to high schools on how to structure courses to meet the mathematics (‘c’) and laboratory science (‘d’) coursework requirements for UC eligibility. The requirements themselves will not be affected.

A detailed proposal from BOARS is enclosed for your consideration. As you will note, the charge of the proposed task force is to review California high school science and mathematics standards and to draft revised language for the science and mathematics course criteria, with the goal of submitting its recommendations to BOARS in spring 2007. If the proposal is accepted, we request that your office confirm participation of members from the Office of Admissions, help coordinate participation of a member from the CSU Office of Admissions, and arrange for staffing and other resources needed to support the scope of the group’s work. I understand that the Director of Undergraduate Admissions will soon submit a budget to you as a supplement to this proposal. On our part, the Academic Council will identify and appoint UC faculty members with appropriate expertise to serve on the task force, and I and the BOARS Chair will continue to coordinate the effort with you throughout the year.

As is pointed out in the proposal, “if UC expects students in a-g courses to learn something more or different than what the state has specified as standards for all students, then it becomes increasingly incumbent on UC to define what the additional knowledge and skills are and how those relate to the adopted state standards.” This review of the guidelines for two subject requirements, as well as the possible subsequent review of other subject requirement guidelines, will help UC fulfill its role and obligations within the California education system. I hope the proposal meets with favor, and I look forward to receiving your response.

Sincerely,

A handwritten signature in blue ink, appearing to read "John Oakley".

John Oakley, Chair
Academic Council

Copy: Academic Council
Senate Director Bertero-Barceló

Encl: 1



BOARD OF ADMISSIONS AND RELATIONS WITH SCHOOLS (BOARS)
Michael T. Brown, Chair
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July 3, 2006

**JOHN B. OAKLEY, CHAIR
ACADEMIC COUNCIL**

Re: Task Force on Subject ('a-g') Requirements – Guidance to High Schools

Dear Chair Oakley:

Enclosed, please find a proposal for the formation of a joint Senate and administrative Task Force to develop more specific descriptions of the criteria needed for high school courses to fulfill the mathematics ('c') and laboratory science ('d') subject requirements. This proposal was developed by the BOARS Articulation and Evaluation Subcommittee in consultation with UCOP Student Affairs staff, and was unanimously approved by BOARS at its June 16, 2006 meeting. BOARS is seeking the Academic Council's endorsement of the proposal and assistance in moving this work forward in cooperation with the appropriate administrative bodies.

It should be noted that this task force is not charged with recommending revisions to the 'a-g' requirements. Such changes would require amendments to Senate Regulation. Rather, the task force will re-evaluate the guidance that is provided to high schools on how to structure their courses for approval as fulfilling the subject requirements. This task has reached a critical importance as high schools are now required to meet various curricular standards, including those prescribed by the California Department of Education. If UC expects students in 'a-g' courses to learn something more or different than what the state has specified as standards for all students, then it becomes increasingly incumbent on UC to define what the additional knowledge and skills are and how those relate to the adopted state standards.

Formation of this task force will require an investment of financial and other resources beyond the current means of BOARS or the Academic Senate. As part of the Council's endorsement of this proposal, we ask assistance in obtaining the necessary approval and resources, from the Office of the President, to support the task force. Director of Admissions Susan Wilbur and her staff are developing a preliminary budget for this purpose. BOARS also seeks the University Committee on Committees' assistance in identifying and appointing

the Senate representatives to the task force. BOARS is developing a list of potential task force members for UCOC's consideration.

If you have any questions or concerns, please do not hesitate to contact me.

Fiat lux,

A handwritten signature in black ink that reads "Michael T. Brown". The signature is written in a cursive style with a large initial "M".

Michael T. Brown, Chair
BOARS

Encl.: 1

cc: Mark M. Rashid, BOARS Vice Chair
David Stern, Articulation and Evaluation Subcommittee Chair
Susan Wilbur, Director of Admissions
Maria Bertero-Barcelo, Executive Director, Academic Senate
Kimberly Peterson, BOARS Analyst

MTB/kp

DESCRIBING A-G REQUIREMENTS MORE SPECIFICALLY

Scope of Work for a Proposed Task Force

Board of Admissions and Relations with Schools (BOARS)

Approved June 16, 2006

Overview

Under the auspices of BOARS and the UC Office of the President, a task force composed primarily of UC faculty members will be asked to rewrite the language describing some of the a-g courses that are required for admission to UC and CSU. The immediate purpose is to clarify how requirements for admission to public universities in California exceed the curriculum standards that all California public high school students are now expected to fulfill. The initial task force will be asked to review the California high school curriculum standards in science and mathematics, as well as university admission standards in those subjects that have been proposed by other groups. Based on that review, the task force will be asked to submit proposed new language for the science (d) and mathematics (c) course criteria by March 2007.

The a-g requirements

The UC web site¹ describes the a-g course requirements:

The following sequence of high school courses is required by the Academic Senate of the University of California as appropriate for fulfilling the minimum eligibility requirements for admission to the University of California. It also illustrates the minimum level of academic preparation students ought to achieve in high school to undertake university level work.

The a-g requirements can be summarized as follows:

- (a) History / Social Science – Two years, including one year of world history, cultures, and historical geography and one year of U.S. history or one-half year of U.S. history and one-half year of civics or American government.
- (b) English – Four years of college preparatory English that include frequent and regular writing, and reading of classic and modern literature.

¹ www.ucop.edu/a-gGuide/

(c) Mathematics – Three years of college preparatory mathematics that include the topics covered in elementary and advanced algebra and two- and three-dimensional geometry.

(d) Laboratory Science – Two years of laboratory science providing fundamental knowledge in at least two of these three disciplines: biology, chemistry, and physics.

(e) Language Other Than English – Two years of the same language other than English.

(f) Visual & Performing Arts – One year, including dance, drama/theater, music, or visual art.

(g) College Preparatory Elective – One year (two semesters), chosen from additional “a-f” courses beyond those used to satisfy the requirements above, or courses that have been approved solely for use as “g” electives.

The intent of the “a-g” Subject Requirement² is to ensure that students can participate fully in the first-year program at the University in a wide variety of fields of study. The requirements are written deliberately for the benefit of all students expecting to enter the University, and not for preparation for specific majors. UC faculty consider the Subject Requirement to be effective preparation, on many levels, for undergraduate work at the University. This pattern of study assures the faculty that the student has attained a body of general knowledge that will provide breadth and perspective to new, more advanced study. Fulfillment of the “a-g” pattern also demonstrates that the student has attained essential critical thinking and study skills.

The purposes of the a-g subject area requirements are to ensure that entering students

- Can participate fully in the first year program at the University in a broad variety of fields of study;
- Have attained the necessary preparation for courses, majors and programs offered at the University;
- Have attained a body of knowledge that will provide breadth and perspective to new, more advanced studies; and
- Have attained essential critical thinking and study skills.

The following general criteria must be satisfied for courses to meet the requirement:

- Be academically challenging;
- Involve substantial reading and writing;
- Include problems and laboratory work, as appropriate;
- Show serious attention to analytical thinking as well as factual content; and

² http://www.universityofcalifornia.edu/admissions/undergrad_adm/paths_to_adm/freshman/subject_reqs.html

- Develop students' oral and listening skills.

The Board of Admissions and Relations with Schools (BOARS) establishes the subject areas and pattern of courses required for minimum eligibility for freshman admission to the University of California. BOARS is a committee of the University's Academic Senate and includes faculty representatives from each campus of the University. The Academic Senate has been given the responsibility from the UC Regents to set the conditions for admission, subject to final approval of the Board of Regents.

The mathematics requirement is further described as follows:

(c) Mathematics

Three units (equivalent to three one-year courses) of college preparatory mathematics are required. Four units are strongly recommended.

- Elementary Algebra.
- Geometry. Courses must include topics in two- and three-dimensional geometry.
- Advanced Algebra.

NOTES:

- 1 This requirement may be met by completing three one-year courses in algebra, advanced algebra, and geometry.
- 2 Alternatively, this requirement may be met by completing a three-course sequence in integrated mathematics (e.g., Integrated Math Program – IMP). If a student has completed only part of the sequence, the following combinations are acceptable:
 - IMP I + Geometry + Algebra II
 - IMP I + IMP II + Algebra II
 - Algebra I + IMP II + Algebra II
 - Algebra I + IMP II + IMP III
 - Algebra I + Geometry + IMP III
- 3 One-year mathematics courses (e.g., algebra) taken over three or four semesters are acceptable to meet the “c – Mathematics” requirement, but credit will be granted for only one year (two semesters) of work. For students utilizing this pattern, all grades awarded by the school are averaged in the GPA calculation.
- 4 Validating Requirements with Advanced Work. Completion of advanced course work in areas of sequential knowledge, specifically language other than English, chemistry (for 2005 only) and specific mathematics courses with a grade of ‘C’ or higher validates an earlier grade of ‘D/F’ as specified below:
 - 1 Algebra II (Intermediate Algebra) validates Algebra I
 - 2 Trigonometry validates Algebra I, II and Geometry
 - 3 Algebra II/Trigonometry (year course) validates Algebra I,

Algebra II and Geometry. If only the first semester is completed – Algebra II – then only Algebra I is validated.

- 4 Statistics validates Algebra I and Algebra II (but not Geometry)
- 5 Although only three years are required, four years are strongly recommended. Among regularly admitted freshmen, most complete a mathematics course in each grade from 9th through 12th.
- 6 The 1997 version of the *Statement on Competencies in Mathematics Expected of Entering College Students* can be downloaded from the UC Academic Senate's web page at www.universityofcalifornia.edu/senate/reports/mathcomp.html.
- 7 Traditionally, most entering college freshmen have taken pre-calculus and often calculus; however, other advanced courses such as statistics and discrete mathematics can also deepen students' understanding of mathematics.
- 8 The Calculus Readiness tests of the Mathematics Diagnostic Testing Project (MDTP) provide a good indication of the skill attainment upon completing a pre-calculus course. All UC campuses use these tests to determine student placement into calculus. MDTP also provides diagnostic readiness tests for other college preparatory secondary mathematics tests to California teachers and schools. For more information on MDTP, visit the MDTP website at <http://mdtp.ucsd.edu> or contact Donna Ames at (858) 534-4519.
- 9 Students who take calculus in high school are encouraged to take one of the Advanced Placement (AP) Calculus Examinations in order to place out of the comparable college calculus course.
- 10 College prep courses in mathematics taken in 7th and 8th grades with grades of C or higher may be counted toward the subject requirement. However, the principal of the high school from which a student graduates must certify on the transcript that the 7th and 8th grade courses are comparable in content to those offered at the high school. This certification is indicated by the high school awarding grades and credits on the transcript for the 7th and 8th grade courses. Alternately, when an applicant has successfully completed advanced work in an area of sequential knowledge (mathematics, language other than English) with a grade of C or higher, the student is presumed to have completed the earlier course work even if the earlier courses do not appear on the student's academic record.

The science requirement is described as follows:

(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 UC freshmen have a minimum of one year of preparation in each of at least two of the foundational subjects

of biology, chemistry, and physics. This requirement can be satisfied by taking two courses from among these specific subject areas. However, other courses may also qualify, if they provide a core set of knowledge in one of the three foundational subjects.

Certification Categories. Generally, courses that are suitable for satisfying the minimum requirement will fall into one of three categories:

- 1 College-preparatory courses in biology, chemistry, or physics.
- 2 College-preparatory courses which may incorporate applications in some other scientific or career-technical subject area, but which nonetheless cover the core concepts that would be expected in one of the three foundational subjects. A few examples could include some courses in marine biology or agricultural biology, which may qualify as providing appropriate content in basic biology; and some advanced courses in earth and space sciences, which may provide suitable coverage of chemistry or physics. These are only examples; other possibilities exist. However, it is emphasized that courses in this second category must cover, with sufficient depth and rigor, the essential material in one of the foundational subjects in order to qualify for "d" certification.
- 3 The last two years of three-year sequences in Integrated Science, where rigorous coverage of at least two of the foundational subjects is provided.

Additional courses beyond the required minimum of two may be drawn from a fourth category:

- 4 Advanced courses in any scientific subject area which depend on (i.e., build upon while offering substantial new material), and specify as prerequisite, one or more courses from categories 1-3.

Lower-level / introductory science courses that do not specify prerequisite courses from categories 1-3 above, and do not address a majority of concepts that would be expected in any one of the foundational subjects, will be considered for certification in the "g" elective area. Examples of courses that would normally fall into this category include environmental science, physical science, earth science, and Integrated Science 1.

Certification Criteria. To be considered for certification in the "d" subject area, a course must:

- specify, at a minimum, elementary algebra as a prerequisite or co-requisite;
- take an approach consistent with the scientific method in relation to observing, forming hypotheses, testing hypotheses through experimentation and/or further observation, and forming objective conclusions; and
- include hands-on scientific activities that are directly related to and support the other classwork, 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.

NOTES:

- 1 There is no preferred order to the sequence of courses that cover the foundational subject areas.
- 2 Students who have successfully completed a 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. Accordingly, if only ISP I is successfully completed, then two courses from category 1 and 2 above must be completed. If ISP I and only one of ISP II or ISP III are completed, then one additional course from categories 1 or 2 above must be taken to fulfill the “d” 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).

Why add greater specificity to the a-g criteria?

The main reason to add greater specificity is to provide clearer guidance to schools, teachers, students, and parents about what UC and CSU expect students to learn in these courses. Adding this greater specificity will also help provide a better basis for evaluating the quality of a student’s college preparation.

The implementation of state curriculum standards over the past 10 years has created a context within which greater specificity in the a-g criteria may be welcomed by and useful to educators and students in California high schools. Starting in 1997, the California State Board of Education established curriculum standards for California public schools in English language arts, history-social science, mathematics, science, and visual and performing arts.³ The standards spell out in considerable detail what all students are expected to know and be able to do in each subject. Every public school student from grades 2 through 12 is now tested every year on the content of these standards. State law and now Federal law as well (the No Child Left Behind Act of 2001) impose serious sanctions on schools where students’ scores on these tests are too low and do not improve continuously. As intended, the testing and sanctions have focused school boards, administrators, and teachers on instituting curriculum and instruction that will enable students to meet the state standards. Textbooks, too, must match the standards in order to be approved by the state.

³ www.cde.ca.gov/be/st/ss/

The state standards, tests, and textbooks give teachers and schools a clear, strong signal about what students are expected to learn. In contrast, the message currently given by UC's a-g criteria is much less clear. If the a-g criteria are not made more specific, it is safe to assume that secondary school teachers will continue to focus more on the state standards. **If UC expects students in a-g courses to learn something more or different than what the state has specified as standards for all students, then it becomes increasingly incumbent on UC to define what the additional knowledge and skills are and how those relate to the adopted state standards.**

The question of how a-g requirements are similar to and different from state standards is particularly salient in school districts that have decided to make a-g the "default curriculum" for all high school students. San Jose Unified School District led the way, launching such a policy initiative in 1998. In 2006, Los Angeles Unified announced the adoption of a similar policy. The State Superintendent of Public Instruction, Jack O'Connell, has advocated this as a statewide strategy. These local and state policy decisions and proposals increase the urgency of stating more specifically what the a-g criteria actually are and how educators can develop an integrated program of study spanning grades 9-12 that coordinates state curriculum standards with the a-g requirements.

Adding greater specificity to the a-g criteria also may facilitate access to UC and CSU for the growing numbers of students who are participating in non-standard forms of instruction in high school. Project-based learning, independent study, on-line courses, internships, and home schooling are among the array of educational strategies other than traditional classroom instruction that are encountered with increasing frequency around the state. Specifying more directly the knowledge and skills students are expected to learn in a-g courses would make it easier for schools to understand how to ensure that a-g content packaged in different ways still meets the same standards as content presented in traditional a-g high school courses.

Growing use of non-standard structures for high schools is a related trend. Examples include new small high schools, charter schools, and small learning communities within large high schools. These schools are enrolling increasing numbers of students, particularly in urban districts. Large school districts -- including Los Angeles, San Francisco, and Sacramento, among others -- are attempting to group all high school students and teachers into smaller units. They are making greater use of non-standard structures in an attempt to increase students' academic engagement and achievement. These small schools may also incorporate some non-standard forms of education, such as on-line courses or independent study, to give students ways to meet a-g requirements that the

small schools cannot offer due to lack of specialized staff, e.g., a credentialed teacher of physics. These schools often enroll significant proportions of students who may also be members of groups underrepresented in the UC system. It will become increasingly important to ensure that students in these high schools have an equal opportunity to meet a-g requirements while simultaneously being allowed to participate in one of these new educational structures.

Task force composition, scope of work, and timeline

The initial task force will focus on science and mathematics. These two subjects will be considered jointly because they are closely related, but the product of the task force will be new language for describing the (c) and (d) requirements separately.

The task force will consist of:

- two UC Senate faculty members in mathematics
- one UC Senate faculty member in physical science
- one UC Senate faculty member in life science
- one UC Senate faculty member in earth or space science
- one UC Senate faculty member in engineering
- one CSU Senate faculty member in mathematics
- one CSU Senate faculty member in science
- one representative from the California Math Project
- one representative from the California Science Project
- two representatives from the UC Office of Admissions
- one representative from the CSU Office of Admissions
- one high school teacher of mathematics
- one high school teacher of science
- the Chair of BOARS
- the Chair of the BOARS subcommittee on Articulation and Evaluation.

The task force will be chaired by a UC Senate faculty member, or co-chaired by two UC Senate faculty members. The chair or co-chairs also may invite representatives of other relevant groups to participate as non-voting consultants.

The scope of work and timeline are as follows:

1. By October 2006: Review the California curriculum standards in mathematics and science. Also review the 1997 "Statement on Competencies in Mathematics

Expected of Entering College Students,"⁴ the science and math standards in College Knowledge,⁵ the science and math standards in the College Board Standards for College Success, science and math standards produced by the International Baccalaureate program, the National Academy of Sciences, National Research Council, and any other relevant, existing statements of what entering freshmen should know and be able to do in mathematics and science. In addition, review current high school course prerequisites for UC lower division undergraduate courses in mathematics, science, and engineering; and which high school courses satisfy undergraduate breadth requirements in math and science at UC campuses.

2. By December 2006: Draft new language for the (c) and (d) requirements, explaining what entering university freshmen should know and be able to do in these subjects, over and above the California curriculum standards that apply to all high school students. The new language should be substantive but parsimonious. It should describe key concepts and desired ways of thinking in the disciplines.
3. January - March 2007: Receive feedback on the draft language from faculty at UC, CSU, California high schools, and other stakeholders. Consider implications for implementation.
4. By April 2007: submit to BOARS revised language of (c) and (d) requirements. The task force report also should discuss possible barriers to implementation by UC, CSU, and California high schools, and should identify issues that may require further study or action by BOARS.

⁴ www.universityofcalifornia.edu/senate/reports/mathcomp.html

⁵ Conley, D.T. (2005). *College Knowledge*. San Francisco, CA: Jossey-Bass/Wiley.