

**THE
ACADEMIC
SENATE**

October 4, 2004

For California Community Colleges

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The possibility of raising the minimum, Title 5-prescribed, graduation requirements in English and mathematics for students being awarded an AA or AS degree has sparked considerable passion and controversy over several years.

In accord with recent resolutions, the Executive Committee, building on the excellent research of the 2003-2004 Curriculum Committee has prepared the attached framing document to share with your colleagues.

Unlike other Academic Senate publications, this paper does not adopt a position but, in keeping with prior resolutions, promotes informed participation of local senates in this debate. It offers the current context for this discussion, raises issues, and attempts to frame the question before us. The paper also contains information supplemental information in appendices that respond to faculty's various requests for information. It is our intention that this document, and its resources, might be used in the following manner:

- To stimulate continued discussion within English and mathematics departments, among full and part-time faculty;
- To encourage all faculty other than those in English and mathematics--with special emphasis on those in occupational education and counseling--to inquire about the status of these courses on their own campus;
- To solicit input from constituent groups on your campus, including students and administrators;
- To discuss what expectations your local communities--especially employers--have for the writing, mathematics, and related skills of your community college graduates;
- To consider how pre-collegiate basic skills work contributes to the general understanding students have and how successfully these courses do (or do not) prepare students for more sophisticated work; and
- To prepare your local senate delegate to our Fall 2004 plenary session to vote on your behalf on any recommendations or resolutions that may be put forward by faculty across the state.

The paper was designed for readers to move directly to sections of interest to them. We urge you, then, to use this document to further local discussion about the two areas of most concern to us: curriculum and student success.

Thank you for your full attention to this matter of significance.

Cordially,

Kate Clark
President

Issues and Options for Associate Degree Levels In Mathematics and English

Issues and Options for Associate Degree Levels In Mathematics and English

An Executive Committee Framing Document to
Inform Debate within the College Communities and Local Academic Senates

Prepared by the Executive Committee of the Academic Senate

and based on the research of the

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October 2004

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The Question, Contexts, Positions, Options

Purpose of this Paper

This paper addresses a central question regarding the statewide associate degree requirements for mathematics and English: Are the present associate degree minimum course requirements for English and mathematics mandated by Title 5 of the California Code of Regulations appropriate for today's students? If not, we must come to a decision of what change or changes the Academic Senate should recommend.

Unlike most Academic Senate publications, this paper does not adopt a position but, in keeping with prior resolutions, attempts to provide a resource for informed participation of local senates in this debate. This paper offers the current context for this discussion, raises issues, and attempts to frame the question before us. The paper also contains supplemental information in appendices. The discussion, then, that follows provides arguments about the primary question, suggests related issues, and encourages informed discussion on local campuses so that delegates at session may reflect the opinions of their local senates when they vote on resolutions related to these issues.

Scope of Our Discussion

In response to a series of Senate-adopted resolutions (detailed in Appendix A), the Academic Senate Executive Committee asked the Senate's Curriculum Committee to provide forums during 2003-04 to foster discussion about associate degree requirements for mathematics and English and to develop a paper to help local senates understand and make decisions about these issues.

During these colloquia (Appendix B), held in Glendale and Oakland, and discussion at plenary sessions several questions were repeatedly raised. The following four seem to express essential, primary considerations:

1. What do society and employers expect of graduates holding associate degrees?
2. What is meant by a generally *educated person*?
3. Should students on the path to an associate degree be considered *terminal* in their studies, or are they likely to return to higher education at some time for another degree, as might be suggested by "Career Ladders" proponents?
4. Are the mathematics and English levels that students need for associate degrees the same as for those planning to transfer? In other words, is there a basic level that both transfer and non-transfer students need in order to earn a two-year college degree?

In both those discussions and this resultant paper, the following parameters guide the discussion of this framing document:

1. The Title 5 sections under consideration for possible revision (c.f. Section 55805.5) apply only to students who intend to earn associate degrees; other sections (Appendix C) amplify the concept of general education. Students on a path to transfer to a university have separate sets of requirements (e.g., CSU general education or IGETC). Some sections herein discuss transfer students, however, because some associate-degree students indeed go on to transfer.

2. Any Title 5 changes would not apply to certificates; local colleges determine their own certificate requirements.
3. Recurrent questions--worthy of later research--go beyond the scope of this paper, including questions such as these:
 - How many students whose goal is to earn an associate degree will have to spend additional time in basic skills courses preparing to meet a higher standard of proficiency in math and/or English?
 - How many community college students will be affected by changing Title 5 degree requirements?¹
 - How ready are colleges to provide the additional instructional support for students who have difficulty reaching a higher standard in math and/or English?

A Brief Overview

As a result of adopted resolution and public inquiry over the past two years, the Academic Senate for California Community Colleges has provided forums for discussion of this core question of whether to raise the state associate degree requirements in mathematics and English. An October 2003 *Rostrum* article laid out the key issues relating to this question:

Currently statewide minimum requirements specify a course in elementary algebra and a course no more than one level below transfer-level English composition (Title 5, section 55805.5). Thoughtful arguments . . . [have been] put forth by both those who favor raising these requirements and by those opposed to raising them.

Those who favor raising standards pointed out that elementary algebra and English composition one level below transfer-level English composition are unquestionably high-school-level courses and that to offer a college degree for high-school level work undermines the value of that degree . . . Those opposed to raising Title 5 standards for the associate degree requirements in mathematics and English point out that raising standards would in some cases remove the likelihood of many of our overburdened and under-prepared students from gaining their degrees, especially important to people who are the first in their families to attend college. They also point out that more demanding English and mathematics course requirements make sense for transfer students, but that many of our students seek an associate degree for its value in the job market and would be deterred by added requirements that they may not need for this goal. . . . Some faculty hold that decisions about degree requirements should be made by faculty at the local level, not by statute at the state level. (Snowwhite p. 8)

This framing document seeks to provide arguments about the primary questions, suggest related issues, and encourage informed discussion on local campuses so that delegates at session may reflect the opinions of their local senates when they vote on resolutions related to these issues.

¹ Presently, the number of students who earn associate degrees on most community college campuses is relatively small; in addition, it should be noted that among those who earn associate degrees, an unspecified number immediately go on to universities, making it difficult to determine the precise numbers of students who seek the associate degrees as a terminal degree.

A State-Level Philosophy of General Education

In the excerpt below from Title 5 of the California Code of Regulations, the Board of Governors for California Community Colleges articulates its philosophy of general education. It is foundational for any discussion about the meaning of the associate degree and the appropriate levels of achievement for the generally educated person. (Underscoring is added for emphasis.)

§55805. Philosophy and Criteria for Associate Degree and General Education.

- (a) The governing board of a community college district shall adopt policy which states its specific philosophy on General Education. In developing this policy governing boards shall consider the following policy of the Board of Governors:

The awarding of an associate degree is intended to represent more than an accumulation of units. It is to symbolize a successful attempt on the part of the college to lead students through patterns of learning experiences designed to develop certain capabilities and insights. Among these are the ability to think and to communicate clearly and effectively both orally and in writing; to use mathematics; to understand the modes of inquiry of the major disciplines; to be aware of other cultures and times; to achieve insights gained through experience in thinking about ethical problems; and to develop the capacity for self-understanding. In addition to these accomplishments, the student shall possess sufficient depth in some field of knowledge to contribute to lifetime interest.

Central to an associate degree, General Education is designed to introduce students to the variety of means through which people comprehend the modern world. It reflects the conviction of colleges that those who receive their degrees must possess in common certain basic principles, concepts and methodologies both unique to and shared by the various disciplines. College educated persons must be able to use this knowledge when evaluating and appreciating the physical environment, the culture, and the society in which they live. Most importantly, General Education should lead to better self-understanding.

In establishing or modifying a general education program, ways shall be sought to create coherence and integration among the separate requirements. It is also desirable that general education programs involve students actively in examining values inherent in proposed solutions to major social problems.

- (b) The governing board of a community college district shall also establish criteria to determine which courses may be used in implementing its philosophy on the associate degree and general education.
- (c) The governing board of a community college district shall, on a regular basis, review the policy and criteria established pursuant to subsections (a) and (b) of this section.

The Current Context

Current Title 5 Regulations: College Course Levels

While Title 5 sets the minimum statewide level, local colleges may (and many do) set higher levels. Title 5, section 55805.5 specifies the current, associate degree-applicable levels for English (Subsection c) and mathematics (Subsection d). If a regulatory change is recommended, these levels could be raised. Following that, the "types of

courses appropriate" would be readjusted. Again, the underscored text below highlights particularly relevant sections.

§55805.5. Types of Courses Appropriate to the Associate Degree.

The criteria established by the governing board of a community college district to implement its philosophy on the associate degree shall permit only courses that conform to the standards specified in section 55002(a) and that fall into the following categories to be offered for associate degree credit:

- (a) All lower division courses accepted toward the baccalaureate degree by the California State University or University of California or designed to be offered for transfer.
- (b) Courses that apply to the major in non-baccalaureate occupational fields.
- (c) English courses not more than one level below the first transfer level composition course, typically known as English 1A. Each student may count only one such course as credit toward the associate degree.
- (d) All mathematics courses above and including Elementary Algebra.
- (e) Credit courses in English and mathematics taught in or on behalf of other departments and which, as determined by the local governing board require entrance skills at a level equivalent to those necessary for the courses specified in subsections (c) and (d) above.

In short, colleges are permitted to award associate of arts and associate of science degrees to students who have successfully completed Elementary Algebra and an English course one level below English 1A.

Current Regulations: Requirements for High School Graduation

Those who favor raising the requirements in mathematics and/or English maintain that the current requirements are no higher than those now required for earning a high school diploma and therefore appear to be less than college-level. Below is a description of the minimum mathematics and English composition requirements of a California high school diploma followed by a description of the baccalaureate degree requirements in these two discipline areas.

Levels in Mathematics

Effective 2003-2004, California high schools increased the level of mathematics required for graduation. The following section of Title 5 includes these levels.

§51224.5. (a) The adopted course of study for grades 7 to 12, inclusive, shall include algebra as part of the mathematics area of study pursuant to subdivision (f) of Section 51220.

(b) Commencing with the 2003-04 school year and each year thereafter, at least one course, or a combination of the two courses in mathematics required to be completed pursuant to subparagraph (B) of paragraph (1) of subdivision (a) of Section 51225.3 by pupils while in grades 9 to 12, inclusive, prior to receiving a diploma of graduation from high school, shall meet or exceed the rigor of the content standards for Algebra I, as adopted by the State Board of Education pursuant to Section 60605.

(c) A pupil who completes coursework in grade 7 or 8 for algebra is not exempt from the mathematics requirements for grades 9 to 12, inclusive, as specified in subdivision (b) of this section or in subparagraph (B) of paragraph (1) of subdivision (a) of Section 51225.3.

Levels in English Language Arts

Current high school standards published by the California State Board of Education for grades eleven and twelve (combined) for reading and writing skills are too comprehensive to list in their entirety, but many of them are similar to course objectives for both transfer-level English (1A) and the course immediately preceding English 1A. For reading, students are expected to analyze features and rhetorical devices in a variety of readings at the appropriate grade level. In addition they are expected to be able to respond to culturally or historically significant works of literature and “conduct in depth analyses of recurrent themes.” They are expected to evaluate the logic of arguments and understand philosophic positions expressed in literature.

For writing skills students are expected to “write coherent and focused texts that convey a well-defined perspective and tightly reasoned argument.” They must at the same time demonstrate awareness of audience and purpose. Writing as a process is also stressed. These students are expected to include research in their writing ranging from field studies to experiments, and, they must be able to use and properly document print and electronic sources. Among other composition skills, they are expected to “revise text to highlight the individual voice, improve sentence variety and style, and enhance subtlety of meaning and tone in ways that are consistent with the purpose, audience, and genre.” In the application of writing skills they are expected to “combine the rhetorical strategies of narration, exposition, persuasion, and description to produce texts of at least 1500 words each ...[and demonstrate] a command of standard American English and ... research, organizational, and drafting strategies....” (*Content Standards*, California State Board of Education, www.cde.ca.gov/be/st/ss)

While more reading and writing is usually required of a community college transfer-level English composition course (1A), the above requirements are not substantially different from those found listed as course objectives for most community college transfer-level composition courses.

These requirements are not substantially different from those found listed as course objectives for most community college transfer-level composition courses. We assume that in general at the community-college level, more reading and writing are required, the depth of coverage of topics is greater, and students produce writing with more sophistication than high school students; however, we can not objectively verify this assumption.

Curricula in the California Community Colleges: Contents of English Curricula

The significant differences between English one level below transfer-level English (1A) and the transfer-level course is not entirely a difference in the topics that are taught. Rather, it is a difference in the depth of coverage, the length of papers required, the complexity of thought, and the difficulty of the required reading and analysis. In the best composition programs, sequential composition courses are carefully articulated to ensure that students who move from one level to the next can apply and continue to master similar skills in new contexts and with an increasing degree of sophistication and complexity.

Thus, the community college composition courses have as their fundamental focus the competencies students have when they enter, the competencies students should carry with them

at the end of the course, and the students' ability to apply those competencies when faced with writing tasks elsewhere in the academy and in the workplace. The competencies expected of students entering college-level courses--whether at UC, CSU, or the California Community Colleges--have been thoroughly articulated in an intersegmental publication, *Academic Literacy: A Statement of Competencies Expected of Students Entering California's Public Colleges and Universities* (2002).² In addition to addressing "Academic Literacy Across the Content Area," it delineates the expected competencies described as "Habits of Mind," "The Reading and Writing Connection," "Listening and Speaking Competencies," "Technology Competencies" and "Competencies for Students Whose Home Language is Other than English."

The principles articulated in that document remain the benchmarks for success, whether the entering student is assessed as needing basic skills level courses or is enrolled in transfer level courses. Some colleges offer as many as four or five levels before transfer level to address the literacy preparation of their students. For this discussion, however, we will examine the curriculum of English 1A itself, as well as the curriculum for those courses presently accepted as meeting the English requirement for a degree: a course "not more than one level before the first transfer level composition course typically known as English 1A" (Title 5 §55805.5). We will look at three specific distinguishing features:

- Emphasis on the writing process
- Course content
- Writing assignments (including the total word requirement for the course)

Emphasis on the Writing Process

For both levels of composition, the courses' outlines adhere to a prevalent approach derived from the cognitive psychologists' emphasis on learning as a process, namely that writing is a recursive process: a writing assignment is considered and reconsidered; initial drafting is augmented or assembled as a result of reconsidering the elements of discourse; drafted work is shared with others, revised, and reframed for conceptual or structural weaknesses or modified to eliminate editorial concerns about format, grammar, punctuation, or the like.

Throughout all phases of a recursive writing process, writers are asked to consider elements of written discourse: the purpose and the larger context driving the communication, the audience(s) that shape what is said and how it is said, and form the final communication will take. English 1A courses regularly attend to these elements of discourse, as do – it must be noted – the adopted state standards and recommended competencies for grades 11 and 12. Ideally, courses one level below English 1A would reflect similar coverage; however, because such courses are not reviewed as part of a transfer package, consistency in course content and objectives may vary.

² Intersegmental Committee of the Academic Senates of the California Community Colleges, the State University, and the University of California. (2002). Sacramento, ICAS/ASCCC. This document also compares the minimal California Language Arts Content Standards (adopted by the state Board of Education for grades 9-12) and the more rigorous high school standards recommended by the intersegmental faculty of the California Educational Round Table.

Available at <http://www.academicssenate.cc.ca.us/Publications/Papers/AcademicLiteracy/main.htm>

Course Content

Composition courses--as they move from inculcation of more basic skills to the elaborated research skills--differ primarily in degree and sophistication. Elementary school writers are expected to learn to write in complete sentences that they combine into unified paragraphs to form a more sustained piece of writing. Understandably, the work they produce during their secondary school years becomes increasingly complex. The same is true of the composition courses taught at the post-secondary level, with review and reinforcement part of the methodology at each level.

The “**content**” of **composition courses** is the nature of the recursive writing process itself and its application. That explicit instruction is coupled with analysis of others’ writing (e.g., professionally written texts, literary works, scholarly publications, classmates’ writing). Students come to understand in their reading assignments how the fundamentals of communication shape what writers say and how they choose to say it. Their examination of fictional and non-fictional work and of rhetorical modes such as comparison/contrast, classification, cause-effect, definition, and process analysis enable them to understand the kinds of decisions they, in turn, must make as student-writers.

Likewise, **rhetorical and argumentative strategies** may be a focus of both classroom discussion and students’ emulation. While narration, exposition, persuasion, argument, and description are named as the rhetorical strategies in the California language arts standards for grades 11 and 12, students’ over-reliance on formulaic approaches makes it difficult for some writers to transfer writing abilities to the interdisciplinary demands student-writers face in the physical and social sciences.

As might be expected, the two levels of composition treat **scholarly research** tasks differently. English 1A courses routinely include fundamental research skills and information competency as well as preparation of a research-based essay. These are valuable skills, given that that English 1A is often a prerequisite for transfer-level courses outside of the English curriculum. In the second semester of a transfer sequence of composition courses, students will build upon these skills, culminating in the writing of one or more lengthy research papers. In contrast, courses one level below English 1A seldom address the research-based essay itself, though students may be introduced to essential collateral skills: appropriate quotation format, beginning research techniques, and citation of sources.

The two course levels often treat the **review of grammar, usage, and punctuation** differently. In English 1A, the expectation is that students, through practice and revision, demonstrate increasing proficiency in writing standard English, even if review of grammar is not a primary or extended focus of instruction. Courses one level below English 1A more explicitly review how grammar, usage, and punctuation, mechanics, and spelling affect the reader and the writer’s intended purpose. Yet overall, it is more accurate to say that the degree to which these editorial matters are addressed in all composition classes is determined by the needs of students enrolled in that particular section and the increasingly sophisticated demands of the assignments over the course of the semester or quarter.

Writing Assignments

Reflecting the process approach, English 1A assignments typically include both in-class and out-of-class writing assignments and often require a journal or other assignments that capture frequent, reflective ruminations and observations. Faculty assign essays of a variety of lengths (often progressively longer), and a research element that may or may not culminate in a full-blown research project. To meet articulation demands of the transfer institutions, students must produce between 6,000-8,000 words of revised, polished final draft text. Such assignments emphasize practice in mastering new critical thinking skills. Readings for these courses serve as the basis or springboard for student writing assignments. Readings need not be solely literary in nature, but frequently are.

Assignments for courses one-level below English 1A also emphasize practice in critical thinking skills, but the practice occurs in the reading and composing of shorter essays, with greater attention given to paragraph and sentence-level concerns.

Curricula in the California Community Colleges: Contents of Mathematics Curricula

Central to this discussion is our ability to differentiate between Elementary and Intermediate Algebra. In this section on Elementary and Intermediate Algebra courses as currently taught in community colleges, of necessity some content-specific jargon will appear.

Eric Temple Bell referred to mathematics as “the queen and servant of science.” On the *queen* side, it is possible to study mathematics purely for the enjoyment of the discipline, not because one wants to use it as a tool for another discipline or because it is something one needs to perform a job. Students asking why they should study mathematics “because I’m never going to need this stuff,” overlook this side of mathematics. The truth is that much of what students study during the course of their education, they are not going to “need.” For example, what does one “need” a history of the U.S. Civil War for? The question confronting us here is how much (if any) mathematics should a “well-educated” student be expected to know?

On the *servant* side, mathematics skills are required for the mastery of subjects in other disciplines, such as physics and engineering. A student would be incapable of understanding much of these disciplines without the requisite mathematical knowledge. The level of mathematical knowledge required varies from discipline to discipline, and often from topic to topic within a discipline. Generally speaking, these disciplines take care of these differences by establishing the correct mathematical prerequisites, after performing a validation process. Most students embarking on these courses of study would end up taking courses in mathematics well beyond the intermediate algebra level.

Taking this second group out of the equation, what would a non-scientific, “well-educated” student learn in a mathematics course at the Intermediate Algebra level beyond the content of an Elementary Algebra course?

What distinguishes the treatment of topics that appear as a student progresses from elementary to intermediate to college algebra, is largely a degree of depth, difficulty, and sophistication.

In arithmetic, students learn to add fractions, but problems can be simple: $1/5 + 2/5$, or more complex: $3/16 + 5/24$, for example. In algebra, we take this a step further, and the topic of adding fractions (also referred to as rational expressions) is studied with variables (letters of the alphabet used to represent unknown quantities) added to the mix. The degree of difficulty can also be quite disparate, similar to the arithmetic example.

Some have likened the study of mathematics to learning a foreign language. If English-speakers take French 2 following French 1, they will ostensibly be studying similar topics: sentence structure, vocabulary, and idioms, for example. But in French 2, their vocabulary would be expanded, sentences formed would be more complex, and idioms studied more esoteric.

Others look upon mathematics as a skill to be learned, similar to learning to play a musical instrument or becoming proficient at a sport. When learning such skills, we concentrate on the same “topics,” but at progressively more complex levels. In piano, at the “elementary” level, we might learn simple scales and chords (perhaps using only the white keys). Progressing to an “intermediate” level, we would still be learning scales and chords, but perhaps at a level where we could start playing simple tunes. As we became more proficient, we would still be studying tunes, but ones that are harder and harder to play. Similarly, the techniques required for mastery in a sport are not essentially different when used in a neighborhood pick-up game or used by the professionals in the sport. The differences are primarily in the degree of depth, difficulty, and sophistication. In all such endeavors, the progression is in depth of understanding.

It is that progression in depth of understanding, and not just the appearance of new topics, that distinguishes the more advanced courses in the sequence from the more elementary ones. To illustrate this idea consider the following two problems, with variations, that may be presented to algebra students.

Problem 1) A copy center charges 7 cents per copy for 300-399 copies and 6 cents per copy for 400 or more. You need 350 copies. How many copies should you have made in order to spend the least amount of money?

This problem can be simply solved by multiplying 350 by 7 cents and 400 by 6 cents and thus determining that it is cheaper to have 400 copies made. A variation at a higher level would be to ask the following question.

What is the minimum number of copies you would actually need to justify ordering 400?

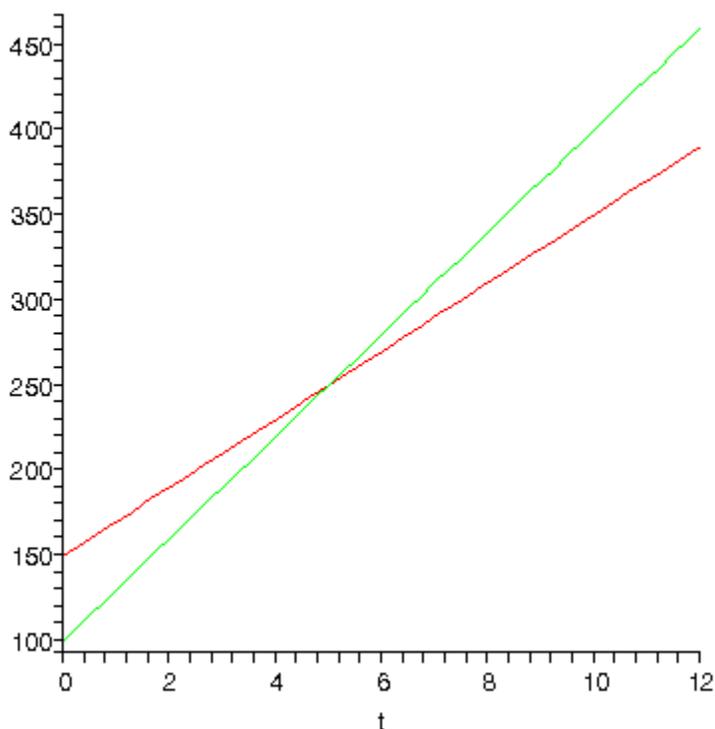
This form of the question introduces an abstraction—an unknown number of copies that the student must determine.

Problem 2) Health Club A has an initiation fee of \$150 and a monthly charge of \$20. Health Club B has an initiation fee of \$100 and a monthly fee of \$30. Which club should you join if you plan on being a member for at least one year?

As in the previous problem the student could simply compute the two cases presented and make the choice. No abstraction is involved. The following question, however, would be a more sophisticated variation.

How many months should you be a member for Club A to be a better deal and how many months should you be a member for club B to be a better deal?

In this question the student is again asked to deal with an abstraction—an unknown number of months. The solution would involve formulating two different linear equations and determining where they “cross”. This problem could also require a graphic representation of the solution as in the following illustration. Each line represents the cost of membership as a function of the number of months.



The following comparison reflects the difference in conventional content for an elementary and an intermediate algebra course. Standard textbooks in use throughout our community college system reveal the following topics common to each:

Content of Elementary Algebra	Content of Intermediate Algebra
Real Numbers Order of Operations, Simplifying Algebraic Expressions Rules of Exponents, Scientific Notation Quadratic Formula, Completing the Square	Real Numbers Linear Equations, Systems of Linear Equations, Solving with Gauss-Jordan method

Pythagorean Theorem Polynomials, Operations on Polynomials, Factoring Solving Polynomial Equations— Applications Problems Arithmetic Operations on Fractions— Rational Expressions Graphing Linear Functions and Polynomials Solving Inequalities Systems of two Equations—Solving Algebraically and Graphically Simplifying Radical Expressions	Inequalities, Systems of Inequalities Functions, Domain and Range, Test for Function Graphs of Relations, Functions and Inverse Functions Composition and Arithmetic operations on Functions More Advanced Applications problems Solving Polynomial and Rational Functions Deriving and using the Quadratic Formula Complex Numbers, Complex Plane Exponential and Logarithmic functions Binomial Theorem Conic Sections Non-Linear Systems of Equations and Inequalities Sequences and Series Mathematical Models—Linear, Quadratic, Exponential
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While it might appear in the above chart that there is overlap in concepts covered in various mathematics courses, what distinguishes one level of mathematics from a different level has less to do with the specific topics or range of concepts, but the depth of study and the level of mastery and sophistication needed to complete progressively more difficult problems.

Comparing community college course content with the course content of the state’s required high school mathematics and English courses, then, would require generalizing about the depth of study and degree of sophistication of student performance as opposed to the topics included in course outlines or statements of expectation. No exact comparisons are possible or, for that matter, can we hope to compare courses at the same level at different high schools or colleges.

English and Math in Other Systems of Higher Education

Comparisons of mathematics and English requirements in California community colleges with the requirements of community colleges in other states are fraught with problems because of the differences between California community colleges and the community colleges in others states. Public policy makers are eager and curious about other state systems; but our policy of open access, as well as our geography, demography, and sheer size renders such comparisons problematic. Nevertheless, anticipating the desires of some to explore any parallels, we provide the following information.

Other Two-Year Systems

The English Council of California Two-Year Colleges (ECCTYC) cites the examples of Arizona, Florida, and Texas as states whose community colleges require “college level” courses in English and math.

Arizona

Curricular decisions are made at the local college level. Arizona community colleges share with Arizona's four-year schools a core general education curriculum of 35 semester units that includes classes in English and math required for a degree. Although local colleges set their own graduation requirements, longstanding practice is such that all degree programs -- AA/AS and AAS, Associate in Applied Science (occupational emphasis) -- must include a transfer-level English course.

Arizona's requirement in math varies between the AA/AS and the AAS degree programs. While AA/AS students must complete a transfer-level math course, many occupational programs require intermediate algebra (equivalent to algebra II in the California high school system).³

Florida

Florida coordinates its two-year and four-year institutions. Students who complete an associate degree are guaranteed admission to a four-year school. The 36-semester unit general education core curriculum in Florida is shared between two-year and four-year institutions, and is established in both statute and regulation. In other words, the requirements for the first two years of college are the same, whether taken at community colleges or state universities.

Texas

Like California, Texas has a high percentage of college students enrolled in community colleges — over half of undergraduate enrollments are in community colleges. Like California, transfer has been a longstanding emphasis in Texas, and low retention rates have also been a concern.

In 1987 the Texas Higher Education Coordinating Board began to develop a statewide core curriculum. New legislation in 1997 built on that foundation and Texas now has “field of study” curricula in place for 38 majors. Courses required for graduation in all majors must be transferable. Virtually all such courses must first be recognized in the Lower Division Academic Course Guide Manual.⁴

Like Florida, Texas administers a mandatory placement test to students seeking to enroll in more than nine units; students whose scores indicate a need for remediation are placed in developmental courses, presumably relatively soon after assessment.

Our Primary Transfer Partners: The California State Universities and the University of California

Though the state's Master Plan specifies very different missions for the California State University and the University of California systems, it is useful to review how their approaches to English and math differ from that of the community colleges.

CSU admits the top 33% of high school graduates, while the UC admits the top 12% of the state's high school graduates. California State University requires that applicants “have or will have graduated from high school” and will “[m]eet the eligibility index with [their] grade point average and test scores” (CSU 2004-05 application packet, p.3).

³ Additional information available at <http://www.dist.maricopa.edu/eddev/curric/>

⁴ www.thecb.state.tx.us/reports/pdf/0407.pdf. Retrieved October 1, 2004.

Because the CSU and UC are *selective* institutions, they are allowed, even mandated, to choose criteria for admission. Not surprisingly, English and math courses are central to those requirements. Both the CSU and UC include among the “A-G Subject requirements”⁵ that students must take before graduation from high school four years of high school English and three years of mathematics, which the CSU application stipulates as “Algebra I, Geometry, and Algebra II; or integrated mathematics including these” (CSU application packet p. 3).

Second, because CSU and UC grant baccalaureate and more advanced degrees, student success at these universities is measured exclusively in terms of degree attainment. By contrast, students enter community colleges with an enormous range of mission-appropriate goals.

A third difference is the assessments that take place upon admission. Both the CSU and UC campuses require students who do not enter with advanced standing (e.g., high performance on AP tests or exemption through SAT II standardized assessments) to take diagnostic tests on admission. However, these tests are used for markedly different purposes of assessment, placement, or exemption. Appendix D provides a discussion of their testing mechanisms, and Appendix E demonstrates how lower division English and mathematics courses fit into their general education patterns.

Some community college faculty argue that if community colleges required basic skills assessment and remediation prior to enrollment in other college-level courses, rates of student failure in courses across the disciplines would be much lower. Further, they argue, if students were assessed prior to enrollment, and if they followed better course sequencing, they would be able to master and apply each level of English and math along the way. In other words, some of the motivation for raising graduation requirements is to raise the mathematics and English skills levels for the general body of community college students. Students, however, might counter that delaying college-level courses until all basic skills remediation is completed would also significantly delay their progress and completion.

Expectations of Employers

Preparing citizens for the workforce was acknowledged as one of the primary goals of public education with the passage of the Vocational Education Act of 1917. Many studies and articles restate the strong relationship between the economic health of the country and the educational system (National Science Board 1983; Peaslee, 1969; Kolde, 1991; Gilbertson, 1999). But the success of our educational institutions in meeting this goal has been seriously questioned. The 1983 federal study *A Nation at Risk: The Imperative for Educational Reform* called for reforming the educational system if the needs of the nation’s economy were to be met (National Commission on Excellence in Education, 1983). A later study, the American Management Association Survey on Workplace Testing, which surveyed 1,627 companies, concluded that over 34% of job applicants tested in 2000 “lacked sufficient skills for the position they sought” (American Management Association). Similar complaints abound, particularly from employers seeking people with technical skills.

These studies reflect dissatisfaction with American education in general to prepare our workforce, but no study could be found that reflects a failure of California community colleges

⁵ A-G refers to categories of courses

to adequately prepare those who earn associate degrees. Nor could evidence be found that indicates employer satisfaction specifically with our associate degree holders.

Yet we have been able to document the growing relationship between vocational preparation and academic education as our world of work becomes more technologically oriented. A 1968 report from the Advisory Council on Vocational Education stated that “there is no longer any room for any dichotomy between intellectual competence and manipulative skills and, therefore, between academic and vocational education.” In a study that evaluated employment preparation in community college curricula by reviewing recent literature, researchers identified highly valued skills in today’s marketplace. The three characteristics that were most highly ranked in these studies were: 1) Knowing how to learn, described as “the most basic of all skills and [...] the key to future success” 2) Competence in reading, writing, and computation, and 3) Effective listening and oral communication skills” (Clagett, 1997).

Data on Degrees Awarded

During the hearings, faculty across the state raised questions about statistical evidence--how many students receive degrees? Many wanted to know whether implementing changes in graduation requirements at some colleges impacted the number of degrees that they awarded.

The data shown below in tables A-B, Figures 1, 2 were derived from material from the Community College System Office, whose staff responded to our request for this data. That data is derived from MIS data reported by the colleges and districts; explanations of errors or anomalies must begin there. Nevertheless, the information presented below begins to provide information necessary for informed discussions.

We must point out, however, that causal relationships inferred from the data can only be conjectural. This information is nonetheless provided, even though it may be insufficient to respond to all concerns that faculty raise. It also signals our system’s need for additional research and for levels of detail not yet present. For example, in both Tables A and B below, there is no indication when the colleges instituted the higher requirement; nor is there a clear sense of how representative these cycles and swings might be for specific colleges or all colleges total.

TABLE A: AA/AS degrees awarded from 1992-2003 at colleges where a higher level of math is required than current Title 5 minimum levels

Colleges	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03
ALL	13522	11635	11286	10538	10466	10310	11150	12116	13203	15190	23030
Cuyamaca	59	40	48	33	46	38	46	62	60	67	135
DeAnza	285	227	217	153	220	203	184	186	203	234	414
Evergreen	44	61	66	71	57	66	61	66	74	66	111
Foothill	95	123	105	120	137	118	116	151	159	133	199
Grossmont	238	170	231	211	214	220	228	234	253	282	330
LA Mission	34	29	26	19	24	24	26	29	22	15	53
MiraCosta	59	31	43	45	44	43	44	62	61	87	101
Moorpark	226	186	143	154	162	154	158	169	207	217	348
Shasta	153	155	128	119	120	131	132	138	162	158	294
West LA	68	74	84	43	59	38	46	47	47	41	65
West Valley	131	75	73	74	57	78	65	67	100	114	139

Note: The first line is the number for the entire system in units of hundreds. The other lines are the actual number of degrees awarded at colleges that require for graduation a higher-level course in math than current Title 5 minimums. Source: Survey conducted by CMC³ (California Mathematics Council Community Colleges)

TABLE B: AA/AS degrees awarded from 1992-2003 at colleges where a higher level of English is required than current Title 5 minimum levels.

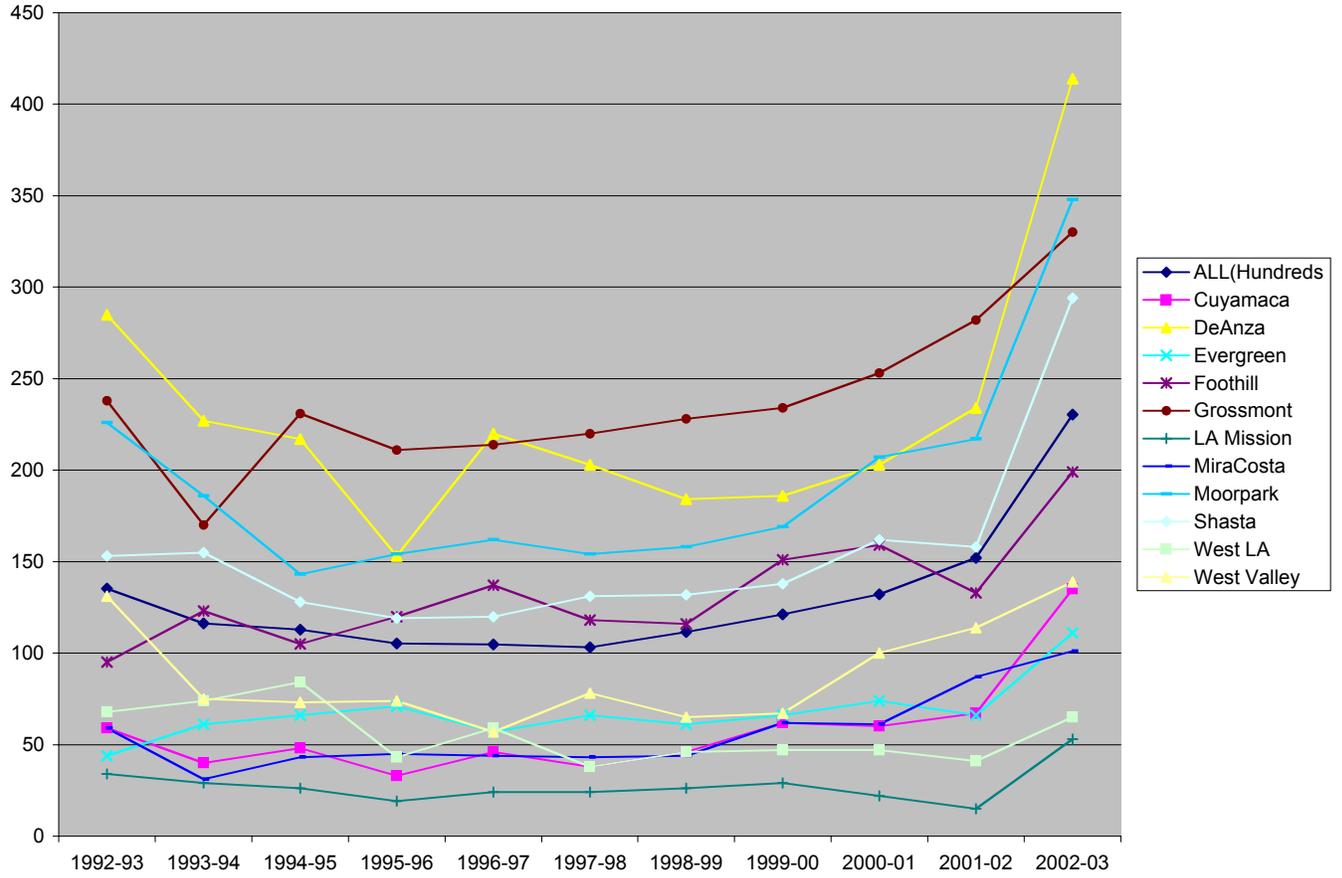
Colleges	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03
ALL	13522	11635	11286	10538	10466	10310	11150	12116	13203	15190	23030
Antelope Valley	49	93	146	92	117	121	114	91	116	166	258
Citrus	43	66	53	117	111	108	130	149	175	160	278
Diablo Valley	230	142	135	100	122	95	94	92	118	142	238
Evergreen	44	61	66	71	57	66	61	66	74	66	111
Feather River	11	14	19	10	14	12	11	13	13	21	47
Foothill	95	123	105	120	137	118	116	151	159	133	199
Hartnell	117	60	76	76	66	57	76	85	78	100	166
Irvine Valley	31	37	40	44	44	65	59	64	58	78	131
Laney	33	32	24	35	44	43	33	51	64	58	87
LA Mission	34	29	26	19	24	24	26	29	22	15	53
MiraCosta	59	31	43	45	44	43	44	62	61	87	101
Moorpark	226	186	143	154	162	154	158	169	297	217	348
Mt. San Antonio	218	156	169	144	155	122	128	145	163	247	389
Palo Verde	4	1	4	3	5	1	9	5	9	13	38
Palomar	178	140	143	158	158	215	199	206	231	220	317
Pasadena	297	219	216	247	208	195	195	233	284	307	451
Rio Hondo	73	79	97	76	96	74	86	95	91	101	203
Saddleback	157	171	143	133	152	176	147	185	162	143	247
San Jose City	78	65	55	45	53	55	48	45	67	43	88

Note: The first line is the number for the entire system in units of hundreds. The other lines are the actual number of degrees awarded at colleges that require for graduation a higher-level course in English than current Title 5 minimums.

Source: Academic Senate Curriculum Committee (2003-04) review of college catalogues.

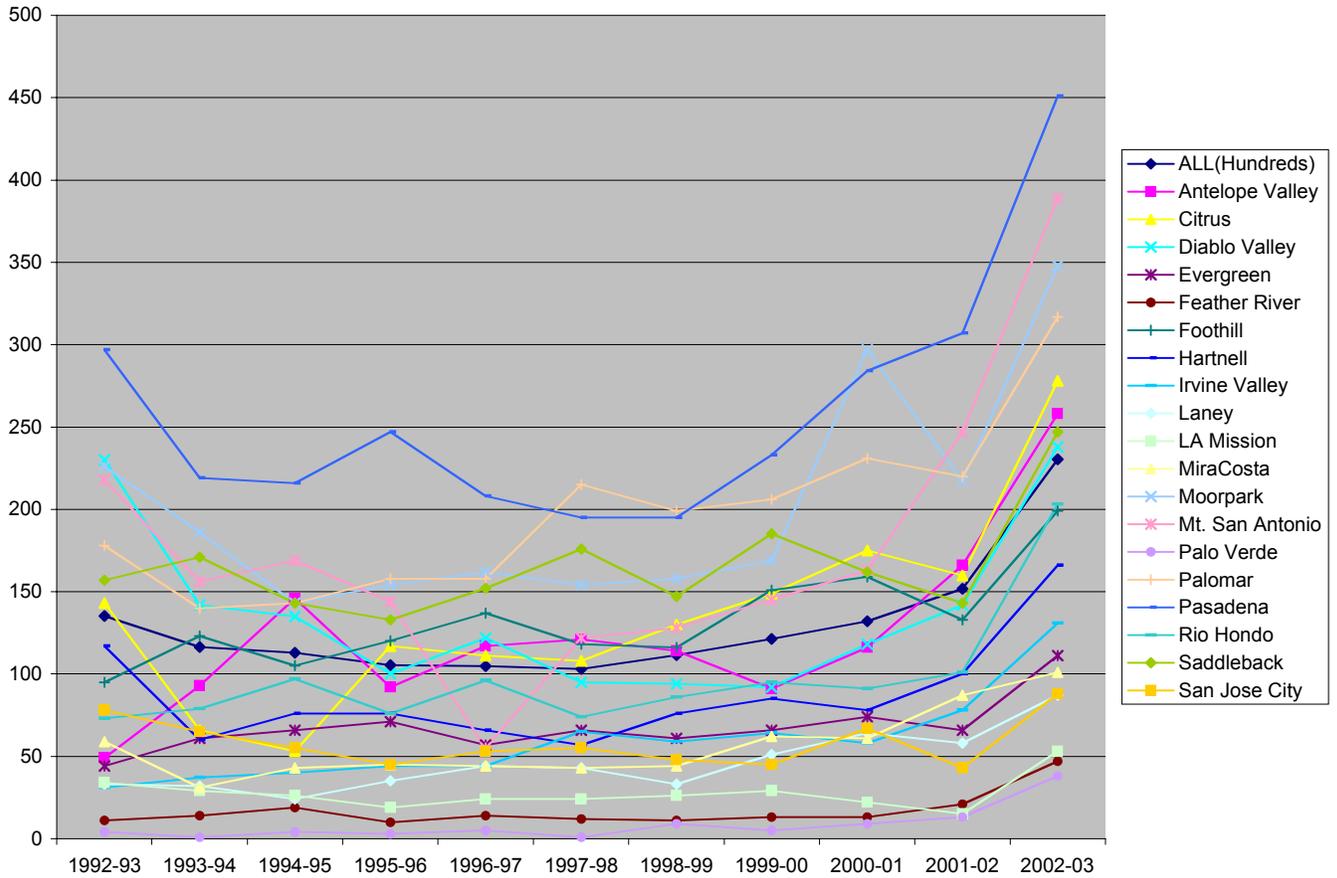
The graphs below (Figures 1 and 2) seem to indicate that trends seen at individual colleges approximate the trend of the community college system as a whole. Further, with rare exception (e.g., West Los Angeles in mathematics) there is a significant linear correlation between the individual colleges and the entire Community College system. Such a correlation does not indicate any kind of causal relation. However, it does appear that those colleges that have increased their graduation requirements have not deviated significantly from the statewide trend of graduates over the last eleven years. On the other hand, without additional data, the figures might merely indicate an overall increase in the number of students attending--or they might reflect the concerted efforts of Partnership for Excellence (PFE) to increase awarding of degrees.

FIGURE 1: AA/AS degrees awarded from 1992-2003 at colleges where a higher level of math is required than current Title 5 minimum levels.



Note: The numbers for the entire system are in units of hundreds.

FIGURE 2: AA/AS degrees awarded from 1992-2003 at colleges where a higher level of English is required than current Title 5 minimum levels.



The above tables show graduation rates for colleges that have raised their graduation requirements above the Title 5 minimums in mathematics or English or both. Unfortunately, we do not know the year in which these colleges made the change, so it is difficult to draw any definitive conclusions from this data. However, what the data do show is that there is no year for any college in the table showing a sharp drop off in graduation rates, indicating that whenever it was that these colleges raised their requirements that change does not appear to have affected the number of students that they graduate.

Our Options

Table C below shows the possible options that have been discussed to date.

TABLE C: Options

English Options

OPTION #1 Status Quo	OPTION #2	OPTION #3
One level below English 1A is minimum allowable level; local senates have the option of raising standards on their campuses.	English 1A (transfer level)	English 1A or another course at the same level as English 1A.

Mathematics Options

OPTION #1 Status Quo	OPTION #2	OPTION #3
Elementary Algebra is minimum allowable level; local senates have the option of raising standards on their campuses.	Intermediate Algebra (still one level below transfer)	Intermediate algebra or another math course with Elementary Algebra as pre-requisite.

In the area of English, some faculty members have recommended increasing the level in English to the transfer level course, typically English 1A. Others have expressed the view that the current English 1A course as it is typically taught may not meet the needs of all associate degree students, some of whom require more practical or applied writing skills. Some colleges have modified existing courses at the level of English 1A to respond to such concerns, while other faculty have simply modified their reading and writing assignments within their existing approved course outline. Reading and composition faculty today often include non-literary materials and workplace-related assignments (e.g., writing of actual letters, essays for job applications) as part of their curriculum.

In the area of mathematics, some faculty have recommended increasing the level to one level below the transfer level (i.e., intermediate algebra) or to the transfer level. Others have said that local math faculty may write their own new mathematics courses that have elementary algebra as a pre-requisite. Such a course might be in the form of mathematics appreciation, mathematics for the liberal arts, or mathematics applied to a specific subject area. Such locally determined courses could provide choices for students and would allow curricula tailored to meet the needs of various occupational fields.

The phrase "or another course" appearing in Table C above represents another sub-option: a course in either English or mathematics could be designed for non-transfer associate degree students. Some faculty have asked, "If our colleagues are concerned about the relevancy of courses offered to students who do not intend to transfer or plan to enter into the workplace upon receipt of their terminal degree, could existing English and mathematics course be modified new

courses could be written?" Appendix F offers suggested topics for inclusion in just such a newly created mathematics course.

Though this call for innovation provides the impetus for creative discussions among colleagues, it must be balanced by other considerations:

- Will these courses support a career-ladders model that opens doors for future study, or will they erect barriers to future advancement?
- Would our transfer-bound students benefit as well from some modification of existing courses to be more workplace relevant?
- Will our transfer partners recognize in modified courses the experiences they require? In short, will the revised courses articulate?
- Do these courses promote a "second-class" degree, a "lesser" education as has been argued?
- How can courses, for example mathematics courses, retain elements of both the "queen" and the "servant"? (see p. 10 above)
- How can we assure inter-and intra-segmental articulation of locally developed courses in English and mathematics?

Any of these options are available to the Academic Senate to recommend to the Board of Governors. After the statewide discussions during 2003-04 and after local senates have read and debated the issues at their colleges, the Academic Senate will consider resolutions that are presented at the plenary session to express the will of the body on this issue.

Pro and Con Positions

To contribute to the discussions that are being held locally, regionally, and statewide, faculty members volunteered to summarize their perspectives and reasons for either recommending a change or for maintaining the *status quo* in 500 words or less. In turn each "pro" or "con" group was afforded an opportunity for rebuttal of the contrary position.

Those who wrote the positions were given the following hypothetical proposition:

The English level in section 55805.5 of Title 5 should be changed to read:

“English courses at the level of course English 1A--- either English 1A or another English course locally developed.”

The mathematics level in section 55805.5 of Title 5 should be changed to read:

“Mathematics courses above and those that have Elementary algebra as a pre-requisite--- either intermediate algebra or another mathematics course locally developed.”

Argument In Favor of Changing Mathematics Requirements

In California, Elementary Algebra qualifies a student for an Associate Degree. In community colleges across the country, Elementary Algebra is considered basic skills, developmental, remedial or foundation. And, in California, Elementary Algebra qualifies California high school students for their high school diploma. Elementary Algebra is becoming the standard mathematics course for eighth grade California and U.S. students. All mathematical organizations consider Elementary Algebra to be a part of basic skills when taught in community college. Finally, Elementary Algebra is TWO courses below the transfer level.

Even raising the graduation requirement to Intermediate Algebra or a mathematics course locally developed at that level (hopefully an applied course), the state graduation requirement will still be a pre-transfer level course.

Not only should community colleges have a higher graduation requirement than high schools, but also society benefits by increasing the mathematics level. Here are some of the reasons to raise the mathematics requirement.

- Mathematics above Elementary Algebra develops critical thinking skills.
- People with a strong mathematics foundation analyze everyday problems differently and with more options.
- A main item on the national agenda is to increase the level of mathematics that high school and college graduates have so that they can compete in a global society, so that Americans compete for American jobs at all levels.
- “Mathematical maturity” is developed slowly over several courses. Employers look to hire students who are mathematically competent. They promote those with the stronger skills and reasoning abilities.
- More and more careers, such as respiratory therapy, viticulture, administration of justice, demand interpretation of graphs and critical thinking skills that are developed in mathematical problem solving courses.

Rebuttal to Pro Statement----Mathematics

An Associate Degree is not something “between” a high school diploma and admission to a university. For those cases where the associate degree is such an intermediate step, the current requirements serve transfer students well, by completing a college-level transferable course, which has Intermediate Algebra as a prerequisite.

Intermediate Algebra is designed to prepare students for college-level work in mathematics. In many instances, this content does not extend the skills of a student that are necessary for his/her success in a vocational area.

Extra work in mathematics than the current requirement may enhance critical thinking skills that are valuable in everyday life, thus helping students become better-informed citizens and more competitive workers. Far more reaching results will be obtained if faculty in each vocational area, in collaboration with mathematics faculty, initiate a process make the mathematical education of our students more relevant to their immediate goals and their everyday lives. A uniform increase in the mathematical requirement that does not recognize the differences among associate degrees will not achieve this.

Ignacio Alarcon. Department of Mathematics. Santa Barbara City College.

Kathy O’Connor. Curriculum Advisory Committee Chair. Santa Barbara City College.

Elementary Algebra has just the start of working with formulas and graphs.

- People need to understand and communicate information effectively in a variety of ways - with numbers, symbols, pictures and words.
- AMATYC (American Mathematics Association of Two Year Colleges) has published a position paper that recommends both the A.A. and the A.S. degrees include at least one college level math course. California is currently at two levels below this.
- Examples of why math matters-- even when the major doesn't require it:
 - Understanding different financial aid packages so a student can choose which option to pursue
 - Calculating different car loan and home mortgage options
 - Understanding and interpreting graphs in daily newspapers, such as one showing the U.S. job outlook
 - Determining how an individual's property tax bill would be affected by passage of a Measure, so a person can vote with information
 - Understanding how money grows exponentially, such as when planning for long range goals and retirement
- In 1983, ASCCC passed a resolution calling for an increase in the mathematics requirement to Intermediate Algebra. This recommendation was made when CSU increased its mathematics graduation requirement to a course requiring Intermediate Algebra as a prerequisite.

Finally, earning an Associates degree should represent greater achievement than a high school diploma. Right now, that is not the case. Now is the time to change that.

Barbara Illowsky, Mathematics, De Anza College, with input from:
Larry Green, Mathematics, Lake Tahoe Community College
Rick Hough, Mathematics, Skyline College
John Lovas, English, De Anza College
Micki Miller, Mathematics, retired from Skyline College
Barbara Sausen, Mathematics, Fresno City College
Paul Setziol, Music, De Anza College

<p style="text-align: center;">Argument Opposed to Changing the Mathematics Requirement</p> <p>The proponents of the change of the mathematics requirement for an associate degree have stated that their proposal is a first step towards requiring a college level mathematics course for the associate degree. A student who attends a four-year institution who is not in a mathematics-science based major has four years to complete their college level mathematics course as part of their general education. The requirement of a college-level mathematics course for an associate degree in a community college, ideally in two years, would certainly constitute an undue burden for most of our students.</p> <p>The proposed change would make the mathematics portion in section 55805.5 of Title 5 read that appropriate courses are “mathematics courses above and those that have Elementary Algebra as a pre-requisite – either intermediate algebra or another mathematics course locally developed.” In a vast number of cases, this would be an unjustified requirement, which would only be an extra barrier to obtain an associate degree.</p> <p>Students who obtain an academic associate degree with the goal of transferring to a four-year institution already satisfy the requirement of a college-level mathematics course, which makes the present system of requirements perfectly adequate. In fields where extra mathematical formation may be required, every effort needs to be made by faculty in those fields and mathematics faculty to develop adequate specific courses that may certainly require beginning algebra as their pre-requisite. A blanket requirement of intermediate algebra or a “locally developed” course for all associate degrees is not well thought-out and would not serve most vocational students well. Intermediate algebra is only a preparatory course for further work in mathematics at the college level. Even the proponents of the change state that intermediate algebra is not the course that would serve the spirit of the change.</p> <p>A proactive, case-by-case approach, by faculty in vocational areas and mathematics to enhance the mathematics curriculum so that students in these</p>	<p style="text-align: center;">Rebuttal to Con Statement---Mathematics</p> <p>Graduates of our vocational education programs will run their own businesses, own homes with mortgages, need to optimize car loans, and live on credit, just like the graduates of our transfer programs. We need to educate and prepare all of our students with the knowledge and skills to make the wisest decisions possible. Thus, a knowledge base in mathematics is independent of the actual major, be it nursing, cosmetology, culinary arts, or auto mechanics.</p> <p>Increasingly, vocational education articles have been citing the need for higher-order thinking and mathematical skills. According to an article by Thomas R. Bailey (“Integrating Academic and Industry Skill Standards” 1998), employers complain when employees cannot work with spreadsheets, but don’t realize that spreadsheets are algebraic based. They also become frustrated by a lack statistical knowledge that prevents employees from understanding modern quality control methods, for example.</p> <p>A certificate of proficiency attests to certain job-related skills; an associate degree represents general education and a higher level of thinking. The proposal at hand is NOT even a college-level course; it is a high school level one. Surely the awarding of a college-level degree justifies the completion of a single course beyond the very lowest high school math offered.</p> <p>Barbara Illowsky, De Anza College</p> <p>Reference Bailey, T. (1998). Integrating Academic and Industry Skill</p>
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<p>areas are better served would be a welcome and worthwhile endeavor. A simple indiscriminate change in the math requirements for an associate degree in our colleges would not achieve this. If the change is implemented, we would be faced with the undesirable situation of not being able to offer anything but intermediate algebra to most students who opt for an associate degree, since locally developed courses that require beginning algebra are not in existence in most cases, and may not even be feasible for areas with small numbers of students, depending on each college’s particular situation.</p> <p>A discussion about changes in the basic requirements of an associate degree needs to take into account that an associate degree in nursing or automotive mechanics has very different needs than one in cosmetology or culinary arts. A constructive discussion of the curriculum in specific areas will achieve offering a better and more useful mathematical formation to our students. A simple “dictum” that changes the current requirements for an associate degree will not.</p> <p>Ignacio Alarcon. Department of Mathematics. Santa Barbara City College. Kathy O’Connor. Curriculum Advisory Committee Chair. Santa Barbara City College.</p>	<p>Standards. New York: Teachers College, Columbia University, Institute on Education and the Economy Brief.</p>
<p style="text-align: center;">Argument in Favor of Changing English Requirement</p> <p>After prolonged face-to-face meetings, individual research in the ten ECCTYC (English Council of California Two-Year Colleges) regions, and email dialog, the ECCTYC Board of Directors overwhelmingly urged all two-year colleges to establish a college level writing class to meet the <i>Minimum English Composition Requirement for Graduation with an Associate Degree</i>:</p> <p>Whereas the mission of the California Community Colleges includes preparing students for transfer to four-year institutions or for a career by providing two years of college-level study for which students receive an Associate of Arts or an Associate of Science degree;</p>	<p style="text-align: center;">Rebuttal to Pro Position ----English</p> <p>The proponent of requiring an English 1A-level course for the Associate degree makes a perilous leap from the ECCTYC statement he cites. In fact, ECCTYC’s call for “college-level” embraces the current Title 5 wording, i.e., one semester below English 1A. Courses at this level confer credit toward the AA/AS. While his final paragraph assumes that only 1A could fill that bill, the state curriculum committee’s own research has found that 75% of the colleges in the state now offer courses one semester below English 1A to fulfill the AA/AS writing requirement.</p>

Whereas today's work environments require the abilities to read and write critically, to comprehend and react to complex texts, and to conduct research and prepare reports;

Therefore ECCTYC urges community college faculty to adopt the successful completion of a college-level English writing course as a requirement for the Associate of Arts and the Associate of Science degrees.

ECCTYC Board of Directors, May 2003

Those who work towards an associate degree as opposed to a certificate clearly seek to distinguish themselves and their work. However, the option to earn a "certificate" remains a viable, healthy alternative to the academic/vocational rigor expected of a college student. Further, ECCTYC found many people who initially planned a terminal AA degree encountered tough competition in the workplace and ended-up transferring to four-year colleges.

One argument against a college level English class for an associate degree assumes that ESL students would be unfairly victimized by such a standard. Granted, students would have more coursework to complete, but that doesn't create student access barriers to colleges and degrees. Financial aid departments, essential for disadvantaged and historically underrepresented students, would not refuse to provide funds for composition classes.

In reality, a change in English graduation requirements would better prepare historically underrepresented and disadvantaged students to break through "glass ceilings" in the workplace, defying social stratification. ECCTYC finds this preferential to establishing enclaves of students with and without real workforce readiness skills.

Another argument states that college writing skills are irrelevant or nontransferable to workplace tasks. Again ECCTYC disagrees based on its

Although some students may choose an AA/AS to "distinguish themselves," others are simply meeting regulatory minima. For example, the state requires an associate degree for a child-care center license. A child-care manager might use business correspondence skills, but not necessarily the skills for drafting expository and research essays taught in English 1A.

Finally, literate employees do enjoy a definite advantage in many workplaces. However, employers prize literacy skills currently taught one level below English 1A. Students may well need better grounding than they are receiving – but the cure for that situation is to fix the earlier courses.

---John Gamber, American River College

surveys, dialogs, and studies. Today’s competitive workforce favors literate employees—employees able to read, write, and critically assess materials. Ironically, the very students opponents of new minimum English graduation requirements seek to protect will end up disadvantaged—a direct result of low social/educational expectations. No change will stunt student learning, suggesting that community colleges function well as “glorified high schools” rather than higher academic/vocational institutions.

A college diploma should be awarded for college work; anything less devalues the associate degree, and disservice students. The fact that “certificate programs” would be exempt from changes to the current Title V regulations assures an alternative to college degrees for students who do less than college work. As John Lovas, DeAnza College noted in an ECCTYC email discussion about English graduation requirements: *I would ask what justification exists for a standard lower than 1A for a degree, and especially what possible justification for lower standards for an AA/A.S. degree?*

Sterling Warner, English, Evergreen College, ECCTYC President

Argument Opposed to Changing the English Requirement

The mission of the community college is steeped in the values of developing each student’s full potential for success and a strong commitment to equal opportunity for all students. We are unique in that we provide vocational programs, basic skills instruction, transfer level classes, and encourage life long learning. **Because of the comprehensiveness of our mission, raising the English graduation requirement is a disservice to students and in direct conflict to the mission of community colleges.**

Therefore, raising the English graduation requirement is opposed for the following reasons:

- **The change would narrow our mission.** It forces the largest segment of students (those not seeking to transfer) to be treated as one of the smallest segments of our student body- those wishing to transfer. Although we will, by law, remain an open access system, permitting students to enter with a *variety of goals* and ability levels, exiting with a degree will be limited to those who have completed the requirement for students with the *specific goal* of transferring.
- **It’s the wrong tool.** In most cases, employer complaints refer to lack of written language control at the sentence and paragraph level. Unfortunately, course outlines reveal that freshman composition is not the course that we could expect to solve this problem because most such outlines assume that students have reached mastery of sentence mechanics and paragraph construction in courses at lower levels. Therefore, strengthening courses below freshman composition would be a more appropriate method of raising standards.
- **It creates an artificially high graduation standard.** College level English is not the final course in a community college education. It has always been a university level course *which happens to be offered* at the community college. Such courses exist to accommodate transfer students and are sufficiently rigorous to permit students' entry into the most demanding of

Rebuttal to Con Position ----English

The CCC mission statement notes: “Primary missions of the Colleges are to offer academic and vocational education at the *lower division level*”—a level the opposition prefers to call “university level.” Well intended people who oppose raising English graduation requirements seem to overlook that the CC mission designates remediation, ESL/noncredit instruction, and support services as “essential functions” that “help students succeed at the postsecondary [college] level.” Lowering the bar of English workplace/university preparedness disservices students, ignoring social responsibility. Strengthening developmental English classes to raise college standards conflicts with pre-college learning objectives. Raising AA/AS English graduation requirements will:

- Allow students seeking only high school level workplace skills to realize their ambitions, acknowledged with certificates rather than college degrees for their accomplishments.
- Direct students to complete GE studies for a degree, leading to greater employability and life-long learning.
- Develop vocational/academic post-high school language skills needed to meet the competitive workforce/university demands.
- Enable increasing numbers of AA/AS graduates acculturated to higher ed, to pursue BAs—something they once thought impossible.

<p>universities. That is not the same level as should be required to graduate from a two year college, as we would not have this course if we were not transferring students to universities.</p> <ul style="list-style-type: none">• The two-year degree is unique. Many universities do not offer degrees in some of the programs for which students can earn an AA or AS degree. If we raise the graduation requirement, we are asking all students who wish to become two year college graduates to complete the course work for a four year system which some do not need to attend, will not attend, and have no desire to attend.• The argument that we should require “college level English” for graduation because we are a college begs the question of the level of our current requirement. Our current requirement is college level because we are, indeed, colleges. The name “college English” is used to differentiate transfer English from community college level English. Renaming the current graduation requirement as “college English” (A.A. /A.S. degree) and “university transfer level English” (BA required) would be preferable to raising the requirement. <p>Deborah Ventura, Ventura College John Gamber, American River College</p>	<p>—Prepare historically underrepresented/under prepared students to break through the glass ceiling of workforce advancement.</p> <p>—Keep AA/AS degrees meaningful, accurate, credible measurements of lower division “college work,” offering students a genuine sense of higher education achievement.</p> <p>Sterling Warner, Evergreen College</p>
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Concluding Thoughts

The complex question of whether or not to revise the current levels of mathematics and English for Associate degrees clearly is an appropriate responsibility of the faculty acting through the Academic Senate. Faculty, after careful consideration, will weigh the advantages and disadvantages, consider the needs of students and of the community, ponder the options, consult with appropriate constituencies at the state level, and ultimately come to a collective decision to be conveyed as appropriate.

Opponents of change point out the following:

- Raising these requirements will not necessarily result in students who are better prepared and may not provide necessary skills to students who have no intention of transferring to a four-year institution.
- Changing the requirements may very well discourage many students from seeking and obtaining an associate degree.
- Students will take longer to meet a higher standard, thereby delaying their transfer.
- Colleges are unable currently to help students succeed now under current requirements because of our limited resources. Raising the requirements will mean we'll be even less effective in helping students who fail or struggle.

Proponents of change make the following claims:

- Students' degrees will, for the first time, represent the work expected of students in the first two years of college. Though the math requirement will remain at a pre-transfer level, our requirements will at least match those of two-year colleges in states with comparable demographic challenges. Whether they need or use those skills, our system will be able to make qualitative claims for itself that it cannot do at present.
- Society is experiencing declining literacy in a host of areas. In the 2002 ICAS document, *Academic Literacy* faculty were asked about their students' skills. "Forty percent of our study respondents indicate that their students' 'ability to tackle complex analytical work' has declined over the course of their teaching years, a figure that rises dramatically with faculty's length of service" (*Academic Literacy*, p15). Though that trend may continue no matter what colleges do, proponents of change hope that more rigorous language arts experiences would help.
- Greater levels of proficiency in mathematics and English will help our students become more employable. The Academic Senate has made a commitment to the "career ladders" concept outlined in the July 2001 *Ladders of Opportunity* Board of Governors initiative. Although some students will not meet higher requirements in English and math, those that do will find themselves in a position to more readily continue their education in programs that would otherwise remain out of reach.

We present this document in the sincere hope that it will stimulate on-campus discussions prior to Area meetings, that it will provoke positive debates about the nature of education and its value to our students and our communities.

Please review the additional information available to you in References and in the appendices that follow.

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Appendix A: Prior Resolutions on Raising English and Mathematics AA/AS Requirements

The question of raising the associate's degree requirements in Title 5 for mathematics and English was introduced at the fall session of 2001 with the adoption of Resolution 9.05 F01, which called for "a breakout session for the Spring 2002 Plenary Session to discuss changing the Title 5 language to include only collegiate level transferable mathematics and English courses to fulfill associate degree requirements for mathematics and English." The following spring session adopted a resolution addressing the means by which the Senate would determine its position. Resolution 9.01 S02 directed the Senate to "hold a breakout at the Fall 2002 Plenary Session to provide for debate and subsequent development of a position on whether to recommend that the Board of Governors amend Title 5 Regulation §55805.5 to include as a requirement for the Associate Degree transfer-level English composition and mathematics." The second part of this resolution directed the Senate to develop a summary of arguments in favor of and opposed to such regulations changes.

At the Fall 2002 plenary session, arguments on raising the requirements were aired in a breakout session, and Senate delegates had the opportunity to vote on resolutions to raise associate's degree math and English requirements or to allow campuses to make that decision locally (in essence making no Title 5 change).

- Resolution 9.06 R(eferred) called for the Senate to support raising the minimum associate's degree requirements for English to a transfer-level composition course and to develop courses on that level for vocationally oriented associate's degree seeking students.
- Resolution 9.05 R called for the Senate to recommend raising the minimum associate's degree requirements in mathematics to a transfer level course within five years. This resolution was countered by
- Resolution 9.04 R, countered 9.05 R, requiring the Senate to support local faculty, working through their local senates, to determine whether to raise the mathematics requirement for an associate's degree beyond elementary algebra.

All three of these resolutions were referred, at the request of their movers, because the delegates did not appear ready to make decisions with such possibly profound ramifications.

FALL 2003

9.02 F03 Raising English and Mathematics AA/AS Requirements Mark Lieu, Ohlone College, Basic Skills Committee

Whereas, Resolutions 9.04R F02, 9.05R F02 and 9.06R F02 referred to the Executive Committee the issue of whether to recommend changing Title 5 Regulations (§55805.5, Paragraph (c)) to raise the level of minimum requirements for the associate's degree in English and mathematics;

Whereas, Resolution 9.01 S03 urged "local senates to engage their campuses in a full discussion of possible options and approaches for addressing the level of English and mathematics courses required for graduation, as well as discussion of advantages, disadvantages and consequences of any such changes";

Whereas, Breakouts about what level of English and mathematics courses should be required for the associate's degree have been held at the two previous plenary sessions (Fall 2002 and Spring 2003); and

Whereas, Resolution 9.01 S03 calls for the Academic Senate to complete a paper for the Spring 2004 Plenary Session on the topic of raising Title 5 associate degree requirements for English and mathematics, and Academic Senate standing committees are gathering information for this paper;

Resolved, That the Academic Senate for California Community Colleges present our position about whether to recommend to the Board of Governors revisions in Title 5 that would change minimum graduation requirements in English and mathematics for the associate of arts and associate of science degrees no later than at the Fall 2004 Plenary Session; and

Resolved, That the Academic Senate for California Community Colleges adopt no position on English and mathematics degree requirements until its Executive Committee provides a recommendation on such a change to the plenary body on such a change.

**9.03 F03 Vocational Students and the Math/English Requirement
Shaaron Vogel, Occupational Education Committee**

Whereas, Vocational programs may have accrediting agencies that are specific in the requirements needed in a particular field of work (e.g., nursing);

Whereas, Vocational education is a critical component of the mission of California community colleges; and

Whereas, Occupational Education faculty are currently underrepresented on the Senate's Curriculum Committee;

Resolved, That the Academic Senate for California Community Colleges ensure that the occupational education perspective is adequately included in its study on the math/English requirement.

SPRING 2003

**9.01 S03 Changing Graduation Requirements for English and Mathematics
Renee Reyes Tuller, Grossmont College, Executive Committee**

Whereas, Numerous community colleges are currently debating changes in their local graduation requirements, and several resolutions introduced and referred by the plenary body at the Fall 2002 session addressed proposed changes to Title 5 English and mathematics requirements for graduation, specifically

9.04 recommended the right of local faculty, working through their local senates to determine mathematics requirements that best meet the needs of their students and communities, while

9.05 recommended immediately raising the statewide mathematics requirement from elementary algebra to intermediate algebra or an equivalent course and to college-level algebra or an equivalent course after five years following implementation, and

9.06 recommended a transfer-level English course be required statewide and urged local senates to design such a course for vocational students seeking an AS degree;

Whereas, Such changes would likely have a significant impact on curriculum, degrees, certificates and correlative courses, as well as potential effects on student retention and completion-matters calling for sustained and informed discussion locally and statewide by faculty members and others; and

Whereas, Discussions now taking place in the field are generating questions about the availability of support services for students (e.g., tutoring and part-time faculty office hours), about the impact of affective elements and students' perceptions and about the possible alternatives or innovative courses that might be considered (e.g., math appreciation courses and English courses incorporating vocational relevance);

Resolved, That the Academic Senate for California Community Colleges urge local senates to engage their campuses in a full discussion of possible options and approaches for addressing the level of English and mathematics courses required for graduation, as well as discussion of advantages, disadvantages and consequences of any such changes; and

Resolved, That the Academic Senate for California Community Colleges provide forums for a collegial exchange of views preliminary to preparing a paper for the Spring 2004 Plenary Session.

FALL 2002

9.04R F02 Degree Requirements: Math Requirements Carolyn Russell, Rio Hondo Community College, Area C

Whereas, For many students the AA/AS degree is a terminal degree enabling employment in vocations with educational needs that do not include transfer level mathematics;

Whereas, The rigor of the mathematics requirement should be based on a level of mathematical sophistication appropriate for the AA/AS degree, not based on bachelor's degree requirements;

Whereas, Increasing the mathematics requirement may present unnecessary and inappropriate barriers for students in achieving an AA/AS degree; and

Whereas, Increasing the mathematics requirement may have a disproportionate impact;

Resolved, That the Academic Senate for California Community Colleges support the right of local faculty, working through their local academic senates, to determine whether requirements beyond elementary algebra best meet the needs of the student population and communities they serve.

9.05R F02 Title 5 Mathematics Requirement for AA/AS Degrees
Zwi Reznik, Fresno City College

Whereas, In 1986, the Academic Senate of California Community Colleges passed a resolution to raise the minimum mathematics requirement to intermediate algebra;

Whereas, The American Mathematical Association of Two-year Colleges (AMATYC) has stated that the AA/AS degree should include at least one college level mathematics course;

Whereas, The California Mathematics Council for Community Colleges supports the AMATYC recommendation; and

Whereas, The minimum mathematics level required for the AA/AS for Texas, Arizona, Florida and New York is at least one transfer level course;

Resolved, That the Academic Senate for California Community Colleges recommend the following change to Title 5 §55805.5 Paragraph D:

"One mathematics course at the level typically known as elementary *intermediate* algebra or the equivalent," and

Resolved, That the Academic Senate for California Community Colleges work with relevant professional organizations to evaluate the appropriateness of recommending raising the minimum requirement to a transfer-level course five years after this change is implemented.

9.06R F02 Raising Requirement for English Composition Necessary for AA/AS Degrees
Mark Snowwhite, Crafton Hills College

Whereas, AA/AS degrees indicate completion of two years of college-level study;

Whereas, Current Title 5 Regulations require English one level below transfer-level English to be sufficient for AA/AS degrees; and

Whereas, All AA/AS degree holders benefit from a rigorous curriculum that prepares them for transfer to a four-year university or a career in an increasingly complex work environment;

Resolved, That the Academic Senate for California Community Colleges support a change in Title 5 Regulations to require that students successfully complete a transfer-level English composition course to qualify for an AA/AS degree; and

Resolved, That the Academic Senate for California Community Colleges urge local senates to approve transfer-level English courses designed for vocational students seeking an AS degree.

SPRING 2002

9.01 S02 Degree Requirements Mark Snowwhite, Crafton Hills College, Executive Committee

Whereas, There is interest among many California community college faculty to raise the level of mastery of English composition and mathematics skills required by Title 5 Regulations to transfer-level courses in those disciplines; and

Whereas, The Academic Senate for California Community Colleges has endorsed the position that transfer-level English and mathematics be required of students who are granted an Associate of Arts or an Associate of Science degree (1983);

Resolved, That the Academic Senate for California Community Colleges hold a breakout at the Fall 2002 Plenary Session to provide for debate and subsequent development of a position on whether to recommend that the Board of Governors amend Title 5 Regulation §55805.5 to include as a requirement for the Associate Degree transfer-level English composition and mathematics; and

Resolved, That the Academic Senate for California Community Colleges develop a summary of arguments in support of and in opposition to raising the level of mastery in English composition and mathematics required for the Associate Degree for use at the Fall 2002 breakout.

FALL 2001

9.05 F01 Title 5 Associate Degree Requirements Barbara Illowsky, DeAnza College

Whereas, Title 5 §55805.5 allows fulfillment of mathematics and English Associate Degree requirements with high school level mathematics and English courses;

Whereas, English and mathematics faculty wish to examine and discuss possible changes to the relevant Title 5 language;

Whereas, The Academic Senate for California Community Colleges is the body responsible for recommending such changes; and

Issues and Options for Associate Degree Levels in Mathematics and English

Whereas, Every other discipline requirement for the associate degree is a collegiate level transfer course;

Resolved, That the Academic Senate for California Community Colleges plan a breakout session for the Spring 2002 Plenary Session to discuss changing the Title 5 language to include only collegiate level transferable mathematics and English courses to fulfill associate degree requirements for mathematics and English.

Appendix B: Academic Senate Efforts to Encourage Widespread Discussions

Before moving towards a plenary session vote, the 2003-04 curriculum committee offered two forums to ensure that voices were heard from across the state. To that end, the committee did the following:

1. held breakouts at both fall and spring plenary sessions
2. held two regional Curriculum Colloquia in February 2004, in Glendale and Oakland, to provide information and the opportunity for discussion and input to the committee
3. held breakouts at the CIO and CCCAOE conferences to hear the views of administrators in instruction and vocational programs
4. held two breakouts at the Vocational Leadership Seminar, encouraging participation and soliciting input from vocational faculty
5. published a *Rostrum* article providing an update and encouraging local senates to hold local discussions
6. held a general session and small group discussions at the summer 2004 Curriculum Institute
7. prepared this paper to further inform local discussions.

In addition, widespread discussions occurred across the state at Area meetings before the Spring 2004 plenary session, and the topic was discussed in connection with proposed resolutions. Local senate presidents and individual faculty sent comments to the committee as a result of their department and/or senate discussions.

Appendix C: Related Section in Title 5

Another section of Title 5 that informs this discussion is the section about minimum requirements for associate degrees. Because many faculty members do not routinely refer to Title 5, it is excerpted here to help faculty frame the discussion by considering the over-arching philosophy of the associate degree. The underscored statements are especially relevant sections, though they are not recommended for change and are offered only for background.

§55806. Minimum Requirements for the Associate Degree (Applicable July 1, 1983).

The governing board of a community college district shall confer the degree of Associate in Arts or Associate in Science upon a student who has demonstrated competence in reading, in written expression, and in mathematics, and who has satisfactorily completed at least 60 semester units or 90 quarter units of college work. This course work requirement must be fulfilled in a curriculum accepted toward the degree by a college within the district (as shown in its catalog). It must include at least 18 semester or 27 quarter units in General Education and at least 18 semester or 27 quarter units in a major as prescribed in this section. Of the required units, at least 12 semester or 18 quarter units must be completed in residence at the college granting the degree. Exceptions to residence requirements for the Associate Degree may be made by the governing board when it determines that an injustice or undue hardship would be placed on the student.

- (a) Major Requirements. At least 18 semester or 27 quarter units of study taken in a single discipline or related disciplines, as listed in the Community Colleges “Taxonomy of Programs,” shall be required.
- (b) General Education Requirements.
 - (1) Students receiving an Associate Degree shall complete a minimum of 18 semester or 27 quarter units of general education, including a minimum of three semester or four quarter units in each of the areas (A), (B) and (C) and the same minimum in each part of (D). The remainder of the unit requirement is also to be selected from among these four divisions of learning or as determined by local option:
 - (A) Natural Sciences. Courses in the natural sciences are those which examine the physical universe, its life forms, and its natural phenomena. To satisfy the General Education Requirement in natural sciences, a course shall be designed to help the student develop an appreciation and understanding of the scientific method, and encourage an understanding of the relationships between science and other human activities. This category would include introductory or integrative courses in astronomy, biology, chemistry, general physical science, geology, meteorology, oceanography, physical geography, physical anthropology, physics and other scientific disciplines.
 - (B) Social and Behavioral Sciences. Courses in the social and behavioral sciences are those which focus on people as members of society. To satisfy the general education requirement in social and behavioral sciences, a course shall be designed to develop an awareness of the method of inquiry used by the social and behavioral sciences. It shall be designed to stimulate critical thinking about the ways people act and have acted in response to their societies and should promote appreciation of how societies and social subgroups operate. This category would include introductory or integrative

survey courses in cultural anthropology, cultural geography, economics, history, political science, psychology, sociology and related disciplines.

- (C) **Humanities.** Courses in the humanities are those which study the cultural activities and artistic expressions of human beings. To satisfy the general education requirement in the humanities, a course shall be designed to help the student develop an awareness of the ways in which people throughout the ages and in different cultures have responded to themselves and the world around them in artistic and cultural creation and help the student develop aesthetic understanding and an ability to make value judgments. Such courses could include introductory or integrative courses in the arts, foreign languages, literature, philosophy, and religion.
- (D) Language and Rationality. Courses in language and rationality are those which develop for the student the principles and applications of language toward logical thought, clear and precise expression and critical evaluation of communication in whatever symbol system the student uses.
1. **English Composition.** Courses fulfilling the written composition requirement shall be designed to include both expository and argumentative writing.
 2. Communication and Analytical Thinking. Courses fulfilling the communication and analytical thinking requirement include oral communication, mathematics, logic, statistics, computer languages and programming, and related disciplines.

Appendix D: California State University and University of California Assessments

Students admitted to the CSU must take the *English Placement Test* and *Entry Level Mathematics* tests prior to initial enrollment. Both tests are waived for students who establish skills via other exams (for example, a score to 550 or higher on the SAT). Both tests may be taken only once, and both tests require an \$18 fee. Both tests are described as “placement tests” designed to ensure that student subsequently enroll in appropriate courses. Both tests are also described as assessing whether students “demonstrate college-level skills” (“English and Math Competencies” CSU website). The math test in particular is explicitly a review of the material “typically covered in three years of rigorous college preparatory mathematics,” precisely those classes required for admission in the A-G area.

There has been a significant gap between CSU’s goals for proficiency and student performance. In 1996, CSU trustees announced their intention to reduce by half the number of student in need of remediation by 2007, but progress toward that goal has been slower than hoped for. The following table indicates the percentage of students entering CSU with college level English and math proficiency. The CSU Trustee’s goal is to reach 90% proficiency by 2007.

	1998	1999	2000	2001	2002	2003
English	53	54	54	54	51	52
Math	46	52	55	54	63	63

UC Assessment and Exemption

For the UC, the best-known entry-level hurdle is what continues to be known as the Subject A requirement. Students take the Subject A exam statewide in May, but many students do not thereby establish English competence and are placed in a wide variety of courses in their first term of attendance in which they further develop their writing skills or their English language competencies. In the UC system as a whole, perhaps 30% of students enter the University having not yet satisfied the Subject A requirement. Courses vary across the system, however students may not return to a UC campus for the sophomore year if they have still not satisfied the Subject A requirement. The Subject A requirement is best understood as bring students up to the level of writing proficiency required for success in continued college level study. The number of students who have not met the requirement by their second year is very small, typically under 1%.

Unlike the CSU, The University of California does not administer a separate math assessment exam. Students who met A-G eligibility requirements may proceed directly to meeting their campus’s mathematics/quantitative general education requirement. Interestingly, a community college student using IGETC to meet general education requirements will almost always be required to take a math course prior to transferring, but a student transferring to some UC campuses may meet local campus requirements in courses that may require more modest quantitative skills, such as UC Santa Cruz’s Astronomy 2, “Overview of the Universe,” widely taken by native and transfer students alike as the “most manageable” way to meet the campus’s Quantitative general education requirement.

Issues and Options for Associate Degree Levels in Mathematics and English

There are significant differences between the nature and purposes of the exams given to students in the three segments: for UC and CSU, tests serve to identify those worthy of being granted *admission* and those who need no further remediation either prior to or immediately following their admission. Selective admissions requirements mean that those universities can expect students to enter with a modicum of competency, particularly in math. Success on these assessments means that students are exempted from additional courses and may begin college-level math and composition entry.

On the other hand, community colleges use assessment exams to determine *placement*. These assessments ideally are administered prior to students' first enrollment. However, regulations permit students to be assessed after completion of no more than six transferable units. Students' achievement on these assessment tests determine the recommended placement in a particular course. In math, that range is considerably broader than courses even offered at CSUs and UCs: from simple mathematics to advanced calculus, from sentence-level composition through a broad range of transfer-level writing courses, from reading at the most primary level to strategic reading of college texts.

The following chart offers a brief look at some of the tests and the purposes they serve at the three segments.

	Math Assessment	Purpose	English: Reading Writing	Purpose	ESL Assessment
UC	SAT II	Admissions;	AP, SAT II; Subject A	Exemption from remedial work upon admission; may identify those requiring ESL courses prior to enrolling in college-level composition work	Subject A Test; other local assessments to identify needs and diagnose appropriate placement
CSU	ELM, or Early Assessment	Admissions; Identifies need for any remedial or preparatory work prior to entry	EPT Examines reading and writing skills	Admissions; Identifies need for any remedial or preparatory work prior to entry	
CCC	Variety approved by state to make careful distinctions of students' ability to succeed in broad range of courses	Placement in courses ranging from basic math to advanced calculus	Variety of tests measuring ESL levels, writing competencies, reading abilities, and critical thinking skills	Placement in appropriate level ranging from ...or recommendations for additional ESL testing or classwork.	Varies: used for diagnosis and recommended placement in essential or auxiliary ESL classes

Appendix E: English and Mathematics in CSU and UC General Education Patterns

Across the state, a wide variety of English and Math requirements exist as general education requirements necessary to complete the baccalaureate degree. Some students meet elements of these requirements through AP test scores (4 or 5) in English Composition or Calculus, but most students meet the requirement through coursework taken in the course of their undergraduate education. Students in the natural sciences easily meet their campus’s math/quantitative general education requirements early through the math classes required by or prerequisite to their majors. They commonly spread their non-science general education requirements across the four years of their study. Students in humanities and social science majors have many fewer lower division prerequisites and take a larger percentage of their general education courses during their first two years. The following chart identifies 4 UC campuses and six CSU campuses, divided between north and south and representing a mix of larger and small campuses with each region. The chart briefly identifies their English and math and general education requirements.

	English	Math
Berkeley (semester) 2001-03 catalog	“two semesters of lower division work in composition”	2 courses in quantitative reasoning
Santa Cruz	C (composition) and W (writing intensive course in a discipline)	Q (Quantitative)
UCLA (Letters & Science)	Literature but no evident composition requirement	science but no evident specific math requirement
San Diego (Muir) 2003-04 catalog	“two analytical writing courses”	year-long sequence in “the natural sciences of mathematics (calculus)” (22)
Chico	English 1 (3 units)	Trig, Stats, Calculus (7 options)
Sacramento	two semesters composition	(I missed copying the page)
San Jose	written communication 1A	math concepts
San Marcos	GEW 101	3-5 units from CS111, GEM 100, Math 115, 125, 132, 160, 162, 212, 260
CSULA	written communication (4 units)	math (4 units)
San Diego (Muir)	two analytical writing courses	a year long sequence in science or math

Appendix F: Possible Topics for New Mathematics Courses Written with Elementary Algebra as a Pre-requisite

This list was prepared by math faculty members (listed at the end) to provide suggestions for revising mathematics curriculum locally.

Guidelines

- The list below does not include any of the standard Intermediate Algebra topics. Any of them may be also included as desired in developing a new course.
- Throughout the course content, the instructor should emphasize problem solving skills, critical thinking techniques, and strategies for learning how to learn.
- Many of these topics are also in transfer-level courses. However, in this course they must be taught at the Intermediate Algebra level (i.e. with only Elementary Algebra as a prerequisite).
- This course could not serve as a prerequisite to a transfer-level mathematics course. The transfer-level mathematics courses are required to have Intermediate Algebra as a prerequisite in order to articulate with CSU and UC.
- This course is intended to be a terminal course, serving as a graduation substitute for those students who do not take Intermediate Algebra.
- The topics in this course will vary from college to college.
- Real world and workplace applications should be incorporated as much as possible.
- Faculty are encouraged to develop their course with the mathematical needs of their particular student body in mind.

The list below is not meant to be exhaustive. It is not required that all topics be included in a single course. Each college would develop its own course to meet local students' needs. They are suggested topics that faculty, listed below in alphabetical order, have contributed.

<p>Comparison of Voting Methods Plurality Run-off Methods Scoring Systems Ranking Methods Approval Voting Comparison of Apportionment Methods Quota Methods Early Methods Current Methods</p>	<p>Linear Programming Linear Modeling Maximize Profit Minimize Business Costs</p>
<p>Financial Math Simple Interest Compound Interest Future Value Present Value Annuities Loans, including Financial Aid Packages Effective Yield Population Growth</p>	<p>Probability Venn Diagrams Addition Rule Complement Independent Events Dependent Events Conditional Probabilities Mutually Exclusive Events Counting Principles</p>

Issues and Options for Associate Degree Levels in Mathematics and English

	Multiplication Rule Trees
Fractals	Number Theory
Functions Definitions Applications	Reasoning Inductive Reasoning Deductive Reasoning Patterns Logical Connectives Argument Forms Symbolic Logic Truth and Falsehood of Compound Statements Puzzle/problem Solving
Game Theory	Set Theory Sets, subsets, attributes, categorization Notation and representation Operations Cardinality
Geometry Basic figures in geometry Deductive reasoning Parallel lines and planes Congruent triangles Quadrilaterals Inequalities in geometry Similar polygons Right triangles Circles Constructions and loci Areas and plane figures Areas and volumes of solids Coordinate geometry Non-Euclidean Geometry Polyhedra Transformations and Symmetries Intro to Axioms, Proofs, and Theorems Manipulatives	Statistics Randomness versus deterministic Data and sampling Organizing Data Measures of Center and Spread Graphs: Histogram, Pie Chart, Box Plot
Graph Theory Paths Networks	Technology Graphing calculator techniques Computer financial software
	Trigonometry Angles Basic definitions Right Triangles Pythagorean Theorem Graphs Construction uses

Compiled by Barbara Illowsky (De Anza College) **with thanks to the following for their contributions and assistance:** Genele Rhoads (Solano Community College), Zwi Reznick (Fresno City College), Norbert Bischof (Merritt College), Fred Teti (City College of San Francisco), Noelle Eckley (Lassen College), Rick Hough (Skyline College & President of CMC³), Susan Dean (De Anza College), Peg Hovde (Grossmont College & Past President of CMC³-South), Teresa Henson (Las Positas College), Janet Tarjan (Bakersfield College), Jay Lehmann (College of San Mateo)

Appendix G Virtual Appendix: Spreadsheets Available at the Academic Senate Website*

- #1 Spreadsheets showing AA and AS degrees earned at all colleges from 1992-2003
- #2 Spreadsheets showing the AA and AS degrees and certificates earned at all colleges from 1992-1996 sorted by TOP codes
- #3 Spreadsheets showing the AA and AS degrees and certificates earned at all colleges from 1996-2000 sorted by TOP codes
- #4 Spreadsheets showing the AA and AS degrees and certificates earned at all colleges from 2000-2003 sorted by TOP codes

* This data will be made available through links contained within the electronic version of this paper found at the Academic Senate website, <http://www.academicssenate.cc.ca.us>