

CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

ACADEMIC SENATE

GENERAL EDUCATION COMMITTEE

Minority REPORT TO

THE ACADEMIC SENATE

Referral Numbers:

- GE-002-167, Satisfaction of GE Subarea A3 by Completion of the B.S. in Chemical Engineering
- GE-003-167, Satisfaction of GE Subarea A3 by Completion of the B.S. in the Aerospace Engineering Program
- GE-004-167, Satisfaction of GE Subarea A3 by Completion of the B.S. in the Civil Engineering Program
- GE-005-167, Satisfaction of GE Subarea A3 by Completion of the B.S. in the Construction Engineering and Management Program
- GE-006-167, Satisfaction of GE Subarea A3 by Completion of the B.S. in the Computer Engineering Program
- GE-007-167, Satisfaction of GE Subarea A3 by Completion of the B.S. in the Electrical Engineering Program
- GE-008-167, Satisfaction of GE Subarea A3 by Completion of the B.S. in the Electromechanical Engineering Technology Program
- GE-009-167, Satisfaction of GE Subarea A3 by Completion of the B.S. in the Electronics Systems Engineering Technology Program
- GE-010-167, Satisfaction of GE Subarea A3 by Completion of the B.S. in the Industrial Engineering Program
- GE-011-167, Satisfaction of GE Subarea A3 by Completion of the B.S. in the Mechanical Engineering Program
- GE-012-167, Satisfaction of GE Subarea A3 by Completion of the B.S. in the Manufacturing Engineering Program

General Education Committee

Date: March 1, 2017

Executive Committee
Received and Forwarded

Date: March 29, 2017

Academic Senate

Date: April 5, 2017
FIRST READING
April 26, 2017
SECOND READING

BACKGROUND:

As explained in the referrals submitted by the College of Engineering, per a Chancellor's Office Memorandum the BS programs in Engineering must either reduce semester units to 120, or apply for an exception from the CO. Engineering majors are typically high-unit majors, and the college has already made significant efforts to reduce its unit count in the past 15 years. The programs submitted under semester conversion range from 126 to 131 units, at or below the current system high of 131. The College duly applied to the CO for exceptions to the 120 unit limit for all its semester BS programs.

The CO's response, which came in the form of an e-mail from AVC Christine Mallon to Interim AVP Daniel Lewis, offered a quid pro quo: the CO would consider granting unit limit exceptions, however "we will want to see Cal Poly Pomona allow double counting of major and GE requirements," specifically singling out the Golden Four GE areas as a target.

It is important to note that the academic senate, not the Chancellor's Office, sets academic policy on our campus in accordance with our needs and those of our student body.

The referrals currently under consideration would exempt engineering students from the requirement to take a class in GE area A3 (Critical Thinking) by certifying that the 11 BS programs in Engineering meet subarea A3 through existing Engineering classes.

RECOMMENDED RESOURCES CONSULTED:

The following resources were consulted:

- M. Ronald Yeung, Interim Associate Dean for Academic Programs & Student Services, College of Engineering
- Abdul B. Sadat, Interim Associate Dean, College of Engineering
- Sharon Hilles, Dean, CLASS
- Sara Garver, Associate Dean, CLASS
- Liliane Fucaloro, Chair, English and Foreign Languages
- Dale Turner, Chair, Philosophy

RECOMMENDED RESOURCES NOT CONSULTED:

The following recommended resources were not consulted, or their responses were received after the committee's vote:

- Larisa Preiser-Houy, Interim Assoc. VP for Undergraduate Programs, Division of Academic Affairs (answer received after vote)
- Francelina A. Neto, Director of Semester Conversion (answer received after vote)

- Cordelia Ontiveros, Interim Dean, College of Engineering (answer received after vote)
- Faculty (faculty@cpp.edu)
- Department Chairs (chairs@cpp.edu)
- Associate Deans (associate_deans@cpp.edu)
- Deans (deans@cpp.edu)

DISCUSSION

The GE Committee is charged with shaping and defining the GE program in accordance with Executive Order 1100, and evaluating GE course proposals. It is the primary body charged with defending the integrity of GE as an integral part of a university education at CPP.

Our semester GE Program was redesigned and approved by the senate quite recently (November 2014) as part of semester conversion. The new program made several improvements and unit reductions vis-à-vis the current quarter-based program. Specifically, it:

- Broadened the language defining GE categories, realigning the category descriptions more closely with the CSU Executive Order, thus allowing GE Courses to be taught by many more departments and reducing disciplinary carve-outs;
- Reduced the overall GE unit requirement under semesters from 51 to 48, the minimum allowed;
- Reduced the sub-categories in GE area D (Social Sciences) from 5 to 4;
- Incorporated GE SLOs defined by the GE Assessment Committee, and mapped to each GE subarea for the purpose of GE assessment.

In other words, our current program is an up-to-date, carefully designed and balanced program that has already been slimmed down to the minimum allowable units in order to accommodate the College of Engineering's need for unit reductions.

In the view of the minority, this proposal, which cuts a further three units of GE for Engineering students in subarea A3 (Critical Thinking), represents a clear degradation to the integrity of our GE program. It weakens the principle of GE as a central aspect of a university education. It deprives Engineering students, who badly need training in humanities-based argument skills, of the opportunity to take philosophy and writing courses, while making no curricular changes to meaningfully integrate these skills into engineering courses.

The proposals include no curricular changes indicating that critical thinking, writing or argument will be addressed through a Writing in the Disciplines model within Engineering. The ECOs incorporate no critical thinking modules, assignments, assessments or other meaningful pedagogical components directed at critical thinking. The ECOs do not incorporate the GE SLOs for area A3.

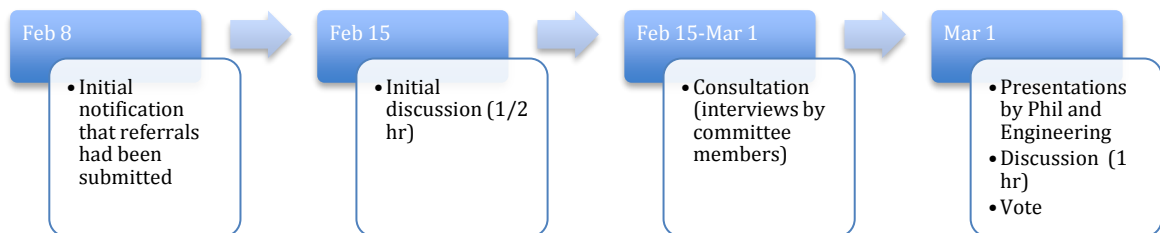
Instead, the proposals assert that critical thinking is de facto something that engineering students already do. It argues that the Engineering Design Process, an iterative procedure of modeling, testing, and refining solutions to engineering problems, by necessity incorporates critical thinking. But Critical Thinking as defined by the CSU and CPP descriptions of subarea A3 deals explicitly with logic encoded in language, something that is not part of the Engineering curriculum.

The minority believes this proposal is deeply flawed and should be rejected because it does not meet A3 (subarea description, SLOs, or assessability), and because it disadvantages our engineering students by reducing training in language-based logic, argument, writing, and ethics.

What the Committee Vote Means (and What it Doesn't)

However, before delving into the specifics, there is an issue of process which must be addressed. Because these proposals represent a sweeping change which will effect our Engineering students as well as the departments who teach A3 courses, pains should be taken to follow a full deliberative and consultative process.

The following timeline of the referrals' progress in the GE Committee makes clear that this has been a rushed process, allowing incomplete deliberation and consultation:



The committee did not take up essential aspects of the proposals such as whether they meet the A3 subarea description, whether they fulfill the A3 SLOs, or whether they are assessable. (The minority believes that on all three counts the proposals fail to meet established standards.)

Many of the resources recommended in the referrals were either not consulted or their answers were received after the vote was taken.

The committee's vote must therefore be understood as a vote, driven by Engineering's arguments for urgency, to move the referrals as quickly as possible to the full senate. The vote does not guarantee that these proposals adequately meet A3.

Proposals do not meet the criteria for GE subarea A3

When looking at GE course proposals, the GE Committee evaluates them primarily on three concerns: whether they meet the GE subarea description, whether they address the GE SLOs assigned to that subarea, and whether they indicate clearly how the GE Assessment Committee can assess fulfillment of the SLOs. Courses deemed weak in any area are sent back to the course authors for editing and improvement.

By these standards, these proposals should be rejected. They do not meet the subarea description, they do not fulfill all of the Student Learning Outcomes, and do not explain how critical thinking is to be assessed.

A3 subarea description: The CPP A3 subarea description mirrors that of the Chancellor's Executive Order governing GE. Both define critical thinking in terms of logic encoded in language:

In critical thinking (subarea A3) courses, students will understand logic and its relation to language; elementary inductive and deductive processes, including an understanding of the formal and informal fallacies of language and thought; and the ability to distinguish matters of fact from issues of judgment or opinion. In A3 courses, students will develop the abilities to analyze, criticize, and advocate ideas; to reason inductively and deductively; and to reach well-supported factual or judgmental conclusions. (EO 1100, echoed exactly by CPP GE Document)

This language essentially describes the humanistic tradition of reasoned argument. These are skills that are central to a university education. After college, they become key tools for sound decision-making in contexts of social or political ambiguity (in other words, when dealing with questions of politics, the social good, or ethics). Likewise, they become key to the leadership abilities of our graduates, since they focus on reasoned persuasion.

The proposals from Engineering do not attempt to meet this description of critical thinking. Instead, they argue that the Engineering Design Process, an iterative approach to engineering problems solving, should be considered the same as critical thinking. The proposals offer the following language, section headings from a scoring rubric, as evidence that the Engineering Design Process constitutes critical thinking:

- I. Presenting and Justifying a Problem and Solution Requirements
- II. Generating and Defending an Original Solution
- III. Constructing and Testing a Prototype
- IV. Evaluation, Reflection, and Recommendations
- V. Documenting and Presenting the Project

While these headings certainly point to thinking, and systematic thinking at that, the language does not address the key elements of critical thinking as defined in our document. They do not address logic and its relation to language, inductive and deductive processes, logical fallacies, the ability to distinguish matters of fact

from issues of judgment or opinion, or the ability to analyze, criticize, and advocate ideas.

A3 Student Learning Outcomes: The A3 subarea is mapped to the following GE SLOs:

- I. Foundational Skills and Capacities
 - 1a. Write effectively for various audiences
 - 1c. Find, evaluate, use and share information effectively and ethically
 - 1d. Construct arguments based on sound evidence and reasoning to support an opinion or conclusion
- IV. Develop capacities for continued development and lifelong learning
 - 4b. Demonstrate activities, techniques or behaviors that promote intellectual or cultural growth

By this measure the proposals fail. They do satisfy 1c, but the rest of the SLOs present problems. 1a presents a problem because the SLO stipulates writing for “various audiences” and an engineering audience is quite uniform. This could be justified by supposing that engineers would write for various audiences when they take their other GE coursework. For 1d, the courses do satisfy the SLO, though the reasoning and argument construction the students are asked to perform are technical (rather than political/social) in nature. With regard to 4b, the SLO is clearly not met. The proposals argue that “this learning objective offers students the ability to consider broader impacts of their engineering solutions,” or similar. They do not address the lifelong learning aspect of 4b.

Assessment: All GE Courses must be assessable by the GE Assessment Committee on the basis of how well they meet the Student Learning Outcomes for their GE subarea.

The proposals note that assessment will take place through the GE Assessment Committee, but they provide no details on the logistics, nor do they attempt to answer any of the legitimate questions or doubts that arise. For instance, by what administrative mechanism would the GE Assessment Committee gain access to student work across many semesters, taught by various instructors? This would seem to be a logistical barrier that requires special arrangements to solve, but none are indicated.

The proposals do not provide evidence of internal Engineering assessment of critical thinking (rubrics, assessment committees, exams, and so forth). AVP Preiser-Houy, in her feedback to the GE Committee, mentioned the possibility of administering exams measuring the critical thinking value add of a CPP engineering major (she referred specifically to the CLA). The proposals do not take up this possibility, and offer no indication of exam-based assessment of critical thinking within Engineering.

In short, serious questions remain about the ability to assess the A3 SLOs under these proposals.

Proposals disadvantage engineering students

By exempting students from A3, and not providing equivalent training within engineering classes, these proposals will disadvantage our graduates professionally. It will make them less qualified to assume positions of leadership in their professional lives as engineers, and less able to deal with the social, political and ethical ramifications of technology and engineering.

There is an established consensus in the literature of Engineering Education that explicit training in critical thinking is necessary for engineers. Responding to this recognition of the importance of critical thinking, the Accreditation Board for Engineering and Technology (ABET) includes among its eleven student outcomes several relating directly to these skills:

- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues

Critical thinking, then, is an essential professional tool as engineers move into their careers and through their careers. It must be explicitly trained, whether in stand-alone classes, or integrated purposefully following a Writing in the Disciplines model. Proficiency in critical thinking is not an inevitable byproduct of the kinds of writing assignments engineering students currently do in their programs.

There is another aspect to this which goes beyond questions of whether an individual CPP graduate may be personally well-educated or fit for leadership roles. As a pressing matter of sound social policy, we need engineers capable of socially-informed decision-making in a democratic society. A subset of the scholarship takes up this dimension of engineering education (for example Nusbaum 2006). ABET has addressed the social consequences of ethical lapses in the profession recently—for instance, with a 2016 panel on the Flint, MI, water crisis, and the Volkswagen emissions scandal. These cases suggest that it is vital that we give engineering students tools to deal with complexity in the political/social arena for the good of our democracy.

Rebuttals of further arguments:

The referrals rely on a comparison between three sets of statements—our A3 SLOs, the headings of a critical thinking rubric produced by a committee of the LEAP Initiative of the AAC&U, and the Engineering Design Process rubric headings cited previously. The argument is that when seen in the light of the AAC&U rubric, the Engineering Design Process is clearly analogous and should be considered critical thinking. The comparison is misleading. With it, the proposals essentially attempt to shift the definition of critical thinking away from the CSU definition that governs our GE program, and toward a definition more

favorable to these proposals. The fact is that the AAC&U document has no role here. A modified Table 2 suggests that several of the comparisons between our A3 SLOs and the Engineering Design Process rubric are forced, if not invalid:

General Education Outcomes (CPP GE SLO)	Engineering Design Process (EDPPSR)
1c. Find, evaluate, use and share information effectively and ethically (research skills)	Presenting and Justifying a Problem and Solution Requirements
4b. Demonstrate activities, techniques or behaviors that promote intellectual or cultural growth (lifelong intellectual or cultural learning)	Generating and Defending an Original Solution
	Constructing and Testing a Prototype
1d. Construct arguments based on sound evidence and reasoning to support an opinion or conclusion (logic and argument)	Evaluation, Reflection, and Recommendations
1a. Write effectively for various audiences (written expression)	Documenting and Presenting the Project

On another point, the referrals try to demonstrate that the loss of FTES experienced by the two departments currently teaching courses in A3 will be minimal because they are offset by the conversion factor of 4.5 quarter units to 3 semester units, and because of projected increases in overall university enrollment. However, as enrollment increases in our colleges, so FTES targets increase for our departments. The loss of A3 engineering students will put Philosophy and EFL at a comparative disadvantage relative to other CLASS departments, leading to weakened departmental positioning within the college and the university.

Lastly, the proposals cite a list of other CSU campuses that have approved the double counting of A3 within engineering majors as justification for this request. However, each university is different, as is each proposal. A cookie cutter approach is bound to produce bad decisions and bad policy. Besides which, it is very possible that the proposals approved on other campuses addressed the weaknesses identified here in a more satisfactory way.

In the end, it is up to the Academic Senate of each institution to safeguard academic policy in a way that serves the particular needs of that institution. The minority feels that cutting philosophy or writing classes without offering meaningful critical thinking training elsewhere in the curriculum is bad for our students and our institution.

RECOMMENDATION:

A minority of the GE Committee recommends that GE-002-167 thru GE-012-167 be rejected.