Date: November 5, 2008
To: Presidents
From: Gary W. Reichard
Subject: Engineering Degrees and Curriculum Redesign

CSU Deans of Engineering, working together to help to advance the Chancellor’s industry partnerships initiative, have begun a systemwide effort to engage CSU campuses in the review and possible reform of baccalaureate engineering programs. At issue are (1) how CSU programs can graduate enough engineers to serve California’s needs, and (2) how the CSU can best prepare graduates for engineering careers—by providing students the full academic preparation required in a sufficiently timely manner that their education is fully relevant when they begin their careers in rapidly-evolving engineering fields. Importantly, addressing the latter issue would also respond to the Trustees’ Graduation Initiative expectation that academic programs, wherever possible, will consist of no more than 120 semester units/180 quarter units for graduation.

Curricular Redesign: Faculty Responsibility and Shared Governance
As the engineering deans continue to address the first of these two challenges by pursuing issues of recruitment, retention, resources, and industry partnerships, I encourage the provosts and faculty to address the second challenge—that of program redesign and unit-reduction—as a broad curriculum review effort that might include redesigning long-established program requirements and courses, integrating new pedagogical models, shifting program focus to student learning outcomes and intentional learning, and integrating general education learning across the undergraduate experience (including in the engineering major).

Reducing Unit Requirements
Much of the work in support of these goals will, of course, be accomplished on the individual campuses—department by department and program by program. While at the system level we have established the goal of reducing engineering program requirements to 120 semester units (180 quarter units), it will be up to campuses, involving their respective academic senates, to decide how best to reduce units.
Double Counting
Campuses are urged to consider curricular redesign strategies that integrate general education goals with learning outcomes for the major program, while still upholding the standards for a CSU baccalaureate degree. When planning for unit reduction, it might be helpful, for example, for programs to allow double counting among GE courses and/or to allow GE credit to be earned for major courses that have been designed to include explicit GE learning outcomes. The outcomes-focus of the new CSU general education policy, E.O. 1033, provides helpful context for such efforts; it can be found at http://www.calstate.edu/EO/EO-1033.html. Through double counting, programs can reduce GE units without compromising institutional or programmatic goals, a priority for the Accreditation Board for Engineering and Technology (ABET). As explained in ABET 2008-2009 accreditation criterion 5 (c), engineering programs shall have “a general education component that complements the technical content of the curriculum and is consistent with the program and institution objectives.”

Applicable Policies
As general assistance, below are cited some existing policies that can be used to facilitate student progress to the degree and to make more efficient the accounting of student learning.

I. Standards for Undergraduate Degree Programs

Breadth in the Baccalaureate
- Coded Memo EP&R-85-13
Estabishes standards for breadth in CSU baccalaureate degrees.

BA Degrees: Required Curriculum
- Title 5 § 40500
Requirements include:
(a) General Education-Breadth Requirement, Sections 40405-40405.4.
(b) Major with a minimum of 24 semester units, at least 12 semester units in the major shall be upper-division courses or their equivalent.
(c) Minor. A minor consisting of 12 or more semester units, of which six must be in upper division credit, may be required [emphasis added].
(d) Additional Units. Units to complete the total required for the degree may be used as electives or to meet other requirements.
(e) Total. A minimum of 120 semester units shall be required, including at least 40 semester units in upper-division courses or their equivalent.
BS Degrees: Required Curriculum

• Paraphrasing Title 5 § 40501

Requirements include:
(a) General Education-Breadth Requirement, Sections 40405-40405.4.
(b) Major with a minimum of 36 semester units, at least 18 semester units in this major shall be upper-division courses or their equivalent.
(c) Total. A minimum of 120 semester units shall be required. The Number of semester units for each curriculum shall be determined by each campus.

II. General Education Breadth Requirements

Double Counting

• EO 1033 2.2.6.1 General Education, Major, and Other Requirements
  http://www.calstate.edu/EO/EO-1033.html

Through a process of campus-wide curriculum review and approval, campuses may permit the “double counting” of courses for General Education Breadth with major requirements and prerequisites only after giving careful consideration to the impact of such actions on general education programs.

• EO 1033 2.2.6.2 [GE] and US History, Constitution, and American Ideals...
  http://www.calstate.edu/EO/EO-1033.html

CSU campuses may permit up to six semester units or eight quarter units taken to meet the United States History, Constitution, and American Ideals Requirement (Title 5 of the California Code of Regulations, Section 40404) to be credited toward also satisfying General Education Breadth Requirements.

Exceptions

• Title 5 § 40405.4(b)

The Chancellor may grant exceptions to the requirements of subdivision (a) of Section 40405.1 for high unit professional degree major programs on a program-by-program basis.

• EO 1033 2.2.5.b http://www.calstate.edu/EO/EO-1033.html

In the case of high-unit professional major degree programs, the chancellor may grant exceptions to one or more requirements for students completing the particular program. Such exception must be approved at the campus level prior to initiating a request to the Chancellor’s Office. A full academic justification shall be submitted to the executive vice
chancellor and chief academic officer, Academic Affairs, who shall submit his or her recommendation and the campus recommendation (along with all relevant documents) to the chancellor.

*Please address campus-approved proposed exceptions to degree requirements:*

Dr. Gary Reichard, Executive Vice Chancellor and Chief Academic Officer  
CSU Office of the Chancellor  
401 Golden Shore  
Long Beach, CA 90802-4210

### III. Supporting Engineering Transfer Students

**Admission: Coursework Required Prior to Transfer**

Prior to transfer, students are required to complete at least 30 units of general education courses, including the “Golden Four”: oral communication, written communication, critical thinking, and mathematics/quantitative reasoning (paraphrasing Title 5 § 40803).


High-unit major programs may request an exception to this admission policy, proposing that prospective students be permitted to delay taking Golden Four coursework until after matriculation to the CSU.

*Please address campus-approved proposed exceptions to admission requirements to:*

Dr. Gary Reichard, Executive Vice Chancellor and Chief Academic Officer  
CSU Office of the Chancellor  
401 Golden Shore  
Long Beach, CA 90802-4210

**Accepting Transfer Credits Toward Residency Requirements**

- Title 5 Section 40403.


(c) When the circumstances of an individual case make it appropriate, the appropriate campus authority may authorize the substitution of credit earned at other campuses or institutions for residence credit.
**Fulfillment of Lower-Division Requirements by Area**

- EO 1033  5.3.3.1
  
  http://www.calstate.edu/EO/EO-1033.html

Students admitted to a CSU campus with [CSU GE Breadth] subject-area certification may not be held to any additional lower-division general education coursework in the subject areas certified.

**Limit on Requirements After Transfer**

Transfer students shall not be required to complete qualifying GE units in excess of the number required of students who matriculated to the campus as freshmen.

- EO 1033  5.3.3.2
  
  http://www.calstate.edu/EO/EO-1033.html

Upon transfer, no student shall be required to complete more units in General Education Breadth than the difference between the number certified in accordance with this executive order and the total units in General Education Breadth required by the campus granting the degree.

**General Education Reciprocity Among CSU Campuses**

- EO 1033  5.6.1  Full Lower-Division Reciprocity
  
  http://www.calstate.edu/EO/EO-1033.html

(a) Full lower-division reciprocity is the process through which all lower-division general education requirements that one CSU campus has designated as having been satisfactorily and entirely completed shall be accepted as fulfilling all lower-division general education requirements of the CSU campus granting the baccalaureate degree—without regard to differences that may exist between the GE requirements of [the] two campuses.

(b) A course or examination is to be regarded as satisfactorily completed if the student’s performance meets the minimum standards for full acceptance toward satisfying a requirement as set by the campus at which the course or examination was taken.

(c) For the purposes of this section, completion of lower-division general education requirements is equivalent to qualification for full certification, as defined in Article 5 above. [See complete posted policy at http://www.calstate.edu/EO/EO-1033.html.]

- EO 1033  5.6.2  Reciprocity as Fulfillment of Full Lower-Division [GE] Requirements
  
  http://www.calstate.edu/EO/EO-1033.html

Transfer students admitted with documentation of full lower-division general education program completion at another CSU campus shall not be held to any additional lower-division general education requirements by the campus awarding the degree.
IV. Facilitating Graduation

Credit for Exams
- Title 5 § 40408
http://government.westlaw.com/linkedslice/search/default.asp?tempinfo=find&RS=GVT1.0&VR=2.0&SP=CCR‐1000

Unit credit toward the degree may be secured by passing an examination given or approved by the appropriate campus authority in courses offered by the campus and for which credit has not otherwise been allowed.

Credit for Exams, Demonstrated Learning, Knowledge, or Skills Acquired Through Experience
- EO 1036 http://www.calstate.edu/EO/EO-1036.html
1.1.1. Students who pass campus-originated challenge examinations (as differentiated from placement examinations) shall earn credit toward the degree and/or toward the determination of admission eligibility.
2.1 Each campus shall have the discretion to determine whether or not enrolled students may earn credit toward the baccalaureate for learning, knowledge, or skills acquired through experience. However, credit for learning, knowledge, or skills acquired through experience shall not be used in determining eligibility for admission.

Planning Tools: Engineering Curriculum Resources
To assist you in this important work, we will support systemwide sharing of campus curricular innovations, and we will provide policy guidance and networking. The following online resources may enhance campus conversations on the topic of redesigning engineering curricula.

- Best Practices for Integrated Curriculum Design and Administration
  http://people.clarkson.edu/~gravande/Best_Practices.pdf

- Redesigning Engineering Curricula for the 21st Century
  http://home.eserver.org/geoff/clec.pdf

- Assessment Tools for General Education Outcomes

- MERLOT.org Engineering materials
  http://www.merlot.org/merlot/materials.htm?materialType=&keywords=engineering&category=

Serious and creative work on the campuses, following traditional processes of curriculum development, along with cross-campus collaboration and sharing of promising approaches, can allow us collectively to achieve the systemwide goal of redesigning engineering programs that
fully prepare students within a 120-unit degree requirement, while assuring learning outcomes consistent with ABET expectations. I thank you, in advance, for your contributions to improving engineering education in the CSU. If you have any questions or would like to share an approach that has been successful at your university, I encourage you to contact Dr. Christine Hanson, State University Dean at chanson@calstate.edu or (562) 951-4672.

c:  Chancellor Charles B. Reed
    President Mohammad H. Qayoumi
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