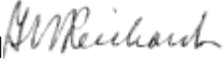


Academic Affairs
401 Golden Shore, 6th Floor
Long Beach, CA 90802-4210

www.calstate.edu

Gary W. Reichard
Executive Vice Chancellor
and Chief Academic Officer
562-951-4710 / Fax 562-951-4986
E-mail greichard@calstate.edu

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.

CSU Campuses

Bakersfield
Channel Islands
Chico
Dominguez Hills
East Bay

Fresno
Fullerton
Humboldt
Long Beach
Los Angeles
Maritime Academy

Monterey Bay
Northridge
Pomona
Sacramento
San Bernardino
San Diego

San Francisco
San José
San Luis Obispo
San Marcos
Sonoma
Stanislaus

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.”

<http://www.abet.org/Linked%20Documents-UPDATE/Criteria%20and%20PP/E001%2008-09%20EAC%20Criteria%2012-04-07.pdf>

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

Establishes standards for breadth in CSU baccalaureate degrees.

http://www.calstate.edu/app/documents/breadth_epr85_13.pdf

BA Degrees: Required Curriculum

- Title 5 § 40500

<http://government.westlaw.com/linkedslice/search/default.asp?tempinfo=find&RS=GVT1.0&VR=2.0&SP=CCR-1000>

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

<http://government.westlaw.com/linkedslice/search/default.asp?tempinfo=find&RS=GVT1.0&VR=2.0&SP=CCR-1000>

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)

<http://government.westlaw.com/linkedslice/search/default.asp?tempinfo=find&RS=GVT1.0&VR=2.0&SP=CCR-1000>

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

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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).

<http://government.westlaw.com/linkedslice/search/default.asp?tempinfo=find&RS=GVT1.0&VR=2.0&SP=CCR-1000>

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.

<http://government.westlaw.com/linkedslice/search/default.asp?tempinfo=find&RS=GVT1.0&VR=2.0&SP=CCR-1000>

(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/celec.pdf>
- **Assessment Tools for General Education Outcomes**
http://www.aacu.org/meetings/institute_gened/documents/MILLER_test_packet_2008.pdf
- **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

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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
Dr. John Tarjan, Chair Academic Senate CSU
Provosts
Associate Provosts/Vice Presidents, Academic Affairs
Deans of Engineering
Deans of Undergraduate Studies
Directors of General Education Programs
Dr. Keith Boyum
Dr. Christine Hanson
Mr. Ken O'Donnell
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