Regarding the 120 unit cap and exemptions for programs such as engineering

From Dr. Mills (California State University):

In a time when our country is in dire need of STEM-trained citizens and the CSU has the opportunity to grow our STEM workforce, the need to keep our engineering programs "engineering strong" is a crucial necessity.

Consider what is unusual, although not unique, to engineering programs. There tend to be no free electives. In other words, if you add the minimum required major units to the minimum required GE units you get the number of units required for the BS degree. This is certainly true of the five engineering programs at Chico.

So there are only two ways to reduce total units in a program under these circumstances – cut GE and/or cut major course requirements. As for GE, at Chico all of the engineering programs already make significant use of double-counting (where a GE course also satisfies a major requirement), substitutions (where a major course qualifies for GE credit) and exemptions (where a GE course requirement is waived). Making additional cuts to GE would, in my mind, be detrimental to Chico's engineering programs. ABET requires that each engineering program includes a "a general education component that complements the technical content of the curriculum and is consistent with the program and institution objectives." If too much of GE is eliminated or modified, this produces an inconsistency with the rest of the university, where GE is a larger component of a student's educational experience. Other campuses in the CSU have not been as amiable as Chico in granting to engineering programs these reductions in GE requirements.

That leaves for Chico cutting major course requirements. We made some such cuts last year to all the engineering programs, dropping from 132 units to 128 units. From my point of view, some of these cuts were detrimental to program quality. Because of the extensive demands ABET places on required learning outcomes, we are under pressure to add courses, not take them away. Many of these increased demands result from great strides in the use of technology, which has had a major impact on
engineering education and the profession. However, we are under increasing pressure to add non-technical components to our program – engineers of the 21st century can't be just technocrats.

To get a sense of these pressures, consider that ABET requires all engineering programs to incorporate eleven learning outcomes throughout the curriculum:

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(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
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

For certain sub-disciplines in engineering, there are other requirements on top of these. For civil engineering, as an example, these consist of the following.

The program must prepare graduates to apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, and at least one additional area of basic science, consistent with the program
educational objectives; apply knowledge of four technical areas appropriate to civil engineering; conduct civil engineering experiments and analyze and interpret the resulting data; design a system, component, or process in more than one civil engineering context; explain basic concepts in management, business, public policy, and leadership; and explain the importance of professional licensure.

For civil engineering at Chico, addressing the four technical areas consists of required coursework in structural engineering, environmental engineering, transportation engineering, and hydraulics/hydrology. ABET also requires that students be exposed to each outcome multiple times, building from a basic introduction of the outcome to increasingly more sophisticated practice of the outcome.

ABET specifies for all engineering programs a curriculum requirement they call the "professional component:"

(a) one year of a combination of college level mathematics and basic sciences (some with experimental experience) appropriate to the discipline. Basic sciences are defined as biological, chemical, and physical sciences.

(b) one and one-half years of engineering topics, consisting of engineering sciences and engineering design appropriate to the student's field of study. The engineering sciences have their roots in mathematics and basic sciences but carry knowledge further toward creative application. These studies provide a bridge between mathematics and basic sciences on the one hand and engineering practice on the other. Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics, and the engineering sciences are applied to convert resources optimally to meet these stated needs.

(c) a general education component that complements the technical content of the curriculum and is consistent with the program and institution objectives.

Students must be prepared for engineering practice through a curriculum
culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple realistic constraints.

The evidence suggests a maximum limit of 132 units would be sufficient at Chico. It would allow us to strategically build components back into our curricula starting from the 128 units we currently have, provided we continue to benefit from the liberal application of GE modifications. A limit lower than 132 would eventually be problematic since, as I already mentioned, dropping to 128 units resulted in some negative impacts to the civil engineering curriculum, and likely to the other engineering programs as well.

Keep in mind this all started with an unsubstantiated assumption – that higher degree units result in an increased time to degree completion. Data that I have investigated suggest that there is not a strong correlation. This effect is perhaps largely negated because engineering majors don't usually change majors (into engineering that is, not out of engineering), they take higher unit loads, and they are more prepared when they start (this is a generalization).

What this all boils down to, however, is, to paraphrase from the senate meeting Senator LoCascio, a mechanical engineering professor at Cal Poly, SLO, do you want to be on an airplane that was designed by engineers with a 120-unit degree, or a 132-unit degree. Think about it.