March 19, 2013

Bringing Down the Total Units Towards Graduation in Engineering and Computer Science (ECS) at CSUF

Here are some thoughts about reducing the units towards BS degrees in Computer Science, Electrical Engineering, Mechanical Engineering, Computer Engineering and Civil Engineering BS degree programs.

The approach outlined here is based on the state wide survey taken by the Chancellor’s Office to determine the GE exemptions/accommodations in various campuses. The adoption of the superset of all of these GE accommodations granted in various campuses will enable CSUF to meet the following objectives:

1. Lower the graduation requirements in Engineering and Computer Science.
2. Meet ABET accreditation standards and requirements.
3. Maintain parity between all the programs within ECS.

Please note that all engineering majors (except Computer Engineering) had a high unit burden until recently. Now, all of them have a total of 129 units for graduation. The curricular revision that achieved such reduction involved the elimination of certain engineering courses. Here are the details:

**Electrical Engineering**
Removed from the curriculum EGME 304 Thermodynamics (3 credits), EGCE 201 Statics (3 credits), EGCE 302 Dynamics (3 credits) and EGME 306A Unified Lab (1 credit). Currently at 129 credits.

**Civil Engineering**
Removed from the curriculum EGME 304 Thermodynamics (3 credits), EGEE 203 Electric Circuits (3 credits) and EGME 205 Digital Computation (3 units) and EGME 306A Unified Lab (1 credit)

**Mechanical Engineering**
Remained at 137 units until Spring 2013.
Going forward, as of Fall 2013, there will be only 129 credit hours. The deduction was brought about by the following reductions in engineering courses: EGEE 303 Electronics (3 units), EGME 426 Design of Thermal and Fluid Systems (3 credits), Physics 227 (1 credit hour), EGME 102 and EGME 322L (total 2 unit reduction from courses in computer aided drafting). Currently at 129 credits.

**Computer Engineering**
The BS in computer engineering is a relatively new program and this was designed without EGME 304 Thermodynamics (3 credits), EGCE 201 Statics (3 credits), EGCE 302 Dynamics (3 credits) and EGME 306A Unified Lab (1 credit). Currently at 129 credits.

**Computer Science**
Became part of ABET accreditation relatively recently. Has a different course mix but is most sensitive to technology changes and need for electives. Currently at 124 credits. Needs to add two CS electives.

To comply with the 120-unit limit, ECS requests an accommodation of nine units of general education courses as shown in the following page.

The ECS faculty maintains that the removal of several of these courses have weakened the technical content of engineering and computer science degrees awarded by CSUF.
Unit Reduction Plan for BS degrees in Civil Engineering, Computer Engineering, Computer Science, Electrical Engineering and Mechanical Engineering at CSUF

<table>
<thead>
<tr>
<th>Category</th>
<th>Needed Reduction</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.3</td>
<td>Critical Thinking 3 units</td>
<td>Critical thinking is part of the engineering and CS experience distributed throughout the curriculum.</td>
</tr>
<tr>
<td>B.2</td>
<td>Life Science 3 units</td>
<td>ECS students take far more science courses that this specific requirement is onerous. This is not a system wide mandate.</td>
</tr>
<tr>
<td>C.1</td>
<td>Lower Division Arts 3 units</td>
<td>Upper Division C.3 reduction is requested as the most reasonable accommodation for ECS majors.</td>
</tr>
<tr>
<td>C.2</td>
<td>Humanities 3 units</td>
<td></td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C.3</td>
<td>Arts &amp; Humanities 3 units</td>
<td>Will also need an exemption from the minimum-unit requirement in upper division GE.</td>
</tr>
</tbody>
</table>

Computer Science will modify the science requirements to 12 credit hours in Physics, Biology, Geology and Chemistry (no fewer than 8 from one of the categories including a lab) to meet ABET requirements and adjusting CS 315 Social and Ethical Issues in Computing to 3 units.

Total GE accommodation needed: 9 units effective academic year 2013-14

Additional observations

1. ECS programs have unilaterally reduced the total credit hours for the BS degree from around high 130’s to below 130. With additional accommodation of GE classes, the degree requirements can be brought down to 120.
2. The last program to reduce the credit hours is mechanical engineering. The reduction was approved in Spring 2013.
3. The CO survey did not include computer science since there are campuses where CS does not reside in the college of engineering. But there should be parity between engineering programs and computer science since both are accredited by ABET.
4. There will be no adverse effect on ABET accreditation if the GE credits are reduced.
5. Reduction of engineering credits will seriously compromise the competitiveness of graduates regionally and globally.