ABET Reforms

- All ABET-accredited programs have been using “outcomes (a)-(k)” for a long time.
- In the last few years, a reform of the standard outcomes has been in development.
- I’ll review the outcomes in the current, nearly final proposal, and discuss how it would affect our program.

Existing Outcomes

(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

Existing Outcomes

(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.

Proposed Outcomes

1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.
3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
4. An ability to communicate effectively with a range of audiences.

Proposed Outcomes

5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

6. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.

7. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.

Observations

- The proposed outcomes are fewer in number, and each has a strong central theme.
- Some proposed outcomes comprise several of the existing outcomes rolled together. E.g., proposed outcome (1) is clearly a combination of (a), (e), and (k).
- None of the existing outcomes are removed, but some that seemed to have a special place [like (j) “a knowledge of contemporary issues”] are subsumed into a more general context [like (6) “An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.”].

"Map" between existing outcomes (a)-(k) and proposed outcomes (1)-(7)

		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
1	solve problems by applying principles	X				X						X
2	analysis and synthesis in design			X								X
3	experimentation and interpretation		X									X
4	communication							X				
5	ethical, global, economic, environmental			X			X		X			
6	continuing education								X	X	X	
7	teamwork				X							

Proposed Curriculum Statement

"The curriculum requirements specify subject areas appropriate to engineering but do not prescribe specific courses. The curriculum must support attainment of the student outcomes and must include:

(a) one academic year of a combination of college-level mathematics and basic sciences (some with experimental experience) appropriate to the program.

(b) one and one-half academic years of engineering topics, consisting of engineering sciences and engineering design appropriate to the program and utilizing modern engineering tools.

Proposed Curriculum Statement

(c) a broad education component that includes humanities and social sciences, complements the technical content of the curriculum, and is consistent with the program educational objectives.

Students must be prepared to enter the professional practice of engineering 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 constraints."

Observations

Minimum one academic year of math and laboratory science:

14 credits of calculus and differential equations

16 credits of introductory laboratory science (phys & chem)

Minimum 1-1/2 academic years of engineering topics:

~27 credits of upper-division physics (includes 6 lab credits)

~39 credits of lower- and upper-division engineering classes

A broad education component:

Covered by our General Education and VWW Programs

Conclusions

Proposed outcomes strongly overlap the existing ones, and seem more focused and organized. We already assess all the existing outcomes, so we would only need to re-organize our system of "which classes assess which outcome."

We already satisfy the proposed curriculum statement.

We do not expect to be negatively affected by the proposed ABET reforms.