

# Proposed Revisions to EAC Criteria 3 and 5

*Perspectives from the Profession*

Dr. Dianne Chong

# Relevant Experience

- Skills Manager at Boeing for multiple functions
  - Diverse degrees
  - Diverse job functions
  - Workforce development
- ABET Experience – 15+ years
- SME Criteria Committee

# Criterion 3 Outcomes Comparison

## Current

- (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.

## Proposed

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.
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.

# Criterion 5 Curriculum Comparison

## Current

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.

## Proposed

(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.

(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.

# Skill Development

		<div style="display: flex; justify-content: space-around; align-items: center;"> <span>J</span> <span>K</span> <span>L</span> <span>M</span> <span>Exec</span> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 5px;"> <span>Tech Princ. (NW)</span> <span>ATF</span> <span>TF</span> <span>STF</span> </div> <div style="border: 1px solid black; padding: 5px; text-align: center; margin-top: 5px;">Grades 1 – 6</div>				
Leadership Training	Project Leadership	Manager K	Manager L	Manager M	Exec 1	Exec 2
General Competencies	<b>Technical Foundation</b>	<b>Teaming Skills</b>	<b>Problem solving</b>			
	<b>Systems Thinking</b>	<b>Communication Skills</b>				
Technical Competencies Training	<p>Engr Process Principles</p> <p style="padding-left: 100px;">Engineering Processes</p> <p>Materials Engr Principles</p> <p>Lab Protocols and Procedures</p> <p>Standardization Requirements</p> <p style="padding-left: 100px;">Manufacturing Methods</p> <p style="padding-left: 100px;">Mat/Engineer Principles</p> <p style="padding-left: 100px;">Engineering Drawings &amp; Specs</p> <p style="padding-left: 100px;">Industry/Govt Standards</p> <p>Materials &amp; Processing</p>	<p>Metallic Materials</p> <p>Polymers &amp; Composites</p> <p>Standard Parts</p> <p>Ceramic Materials/Proc</p> <p>Elec Parts/Mat/Processes</p> <p>Organic Chemical Proc</p> <p>Non-Destructive Eval Proc</p> <p>Inorganic Chemical Proc</p> <p>Assembly Processes</p> <p>Low Observables Tech</p>	<p>Failure Analysis</p> <p>Adhesive Materials/Proc</p> <p>Fuels and Lubricants</p> <p>Failure Analys Knowledge</p> <p>Diminishing Mfg Sources</p> <p>Analytical Skills</p> <p>Corrosion Principles</p> <p>Materials Characterization</p> <p>Production Systems</p>	<p>Flammability Reqmnts</p> <p>Quality Tech Doc</p> <p>Contaminate Control Prin</p> <p>Envir Health &amp; Safety</p> <p>Elastomers</p> <p>Research Methods</p> <p>Test Program Design</p> <p>Prodcn Measuremnt Tech</p> <p>Thermal Protection Matls</p> <p>Chemical Lab Instr</p>		
Company Process Training	IDS Enterprise-Wide Engineering Processes Training	MP&P Enterprise-Wide Common Processes Training				
On-the-Job/ Developmental/ Experiences	<p>Spec Authoring</p> <p>Publish Internal Tech Report</p> <p>Proposal Support</p> <p>Production Support</p> <p>Assess GIDEP Impact</p> <p>Parts Mgr (Small Prog)</p>	<p>Prin Inv on R&amp;D Task</p> <p>Support Special Proj</p> <p>Prepare Capital Bus Case</p> <p>Lead M&amp;P Role on IPT</p> <p>Perform Failure Analysis</p> <p>Lead Supplier Resolution Activity</p>	<p>Publish An Industry Tech Paper</p> <p>Support External Stds Dev Org</p> <p>Participate on a Supplier Qual Team</p> <p>Program Mgr (Small)</p>	<p>Proposal Lead</p> <p>Participate on an Indep Review Team</p> <p>Lead M&amp;P Engr For Large Prod Prog</p> <p>Program Mgr (Large)</p>	<p>Lead Special Proj (eg HILT)</p> <p>Lead an Indep Review Team</p> <p>Parts Mgr (Large Prog)</p> <p>Lead an IPT</p> <p>Site IAD Coordinator</p> <p>Represent Boeing on ESDO</p>	
Formal Education	Engineering Degree	Master of Science / Management / Business		Executive Leadership Curriculum/Program		

Capability Clusters



# Questions

- Alignment of the proposed outcomes (Criterion 3) and the supporting requirements (Criterion 5) with the entry level needs of today's engineering practice regardless whether licensure is or is not anticipated/required
- Sufficiency of the proposed criteria to meet the baseline educational expectations for engineering graduates on the path to professional licensure
- Alignment of the proposed criteria with the expectations for future baccalaureate graduates growing out of: a) recent efforts by NSPE and other engineering societies to define relevant bodies of knowledge, b) the vision of our profession described in the NAE *Engineer 2020* report, and c) the Graduate Attributes promulgated by the IEA pursuant to the Washington Accord, to which ABET is a signatory
- Alignment of the proposed criteria with efforts to foster inclusiveness in the engineering profession

# Summary

- The proposed criteria serve the same purpose as the current criteria
- The proposed criteria meet the needs of the profession