

Educating the Future Civil Engineer for the New Civil Engineering Body of Knowledge

2010 Structures Congress

Kenneth J. Fridley

Chair, BOK Educational Fulfillment Committee

Committee on the Academic Prerequisites for Professional Practice (CAP³)

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Technical

5. Materials science
6. Mechanics
7. Experiments
8. Problem recognition & solving
9. Design
10. Sustainability
11. Contemporary issues & historical perspectives
12. Risk & uncertainty
13. Project management
14. Breadth in CE areas
15. Technical specialization

Professional

16. Communication
17. Public policy
18. Business & public administration
19. Globalization
20. Leadership
21. Teamwork
22. Attitudes
23. Lifelong learning
24. Professional & ethical responsibility

Foundational

1. Mathematics
2. Natural sciences
3. Humanities
4. Social sciences

Bloom's Taxonomy



Graphical Representation of BOK2 Outcome Rubric

OUTCOME	OUTCOME TITLE	LEVEL OF ACHIEVEMENT					
		1	2	3	4	5	6
1	Mathematics	B	B	B			
2	Natural Sciences	B	B	B			
3	Humanities	B	B	B			
4	Social Sciences	B	B	B			
5	Material Science	B	B	B			
6	Mechanics	B	B	B	B		
7	Experiments	B	B	B	B	M/30	
8	Problem Recognition/Solving	B	B	B	M/30		
9	Design	B	B	B	B	B	E
10	Sustainability	B	B	B	E		
11	Contemporary Issues/History	B	B	B	E		
12	Risk & Uncertainty	B	B	B	E		
13	Project Management	B	B	B	E		
14	Breadth in CE	B	B	B	B		
15	Tech Specialization	B	M/30	M/30	M/30	M/30	E

Graphical Representation of BOK2 Outcome Rubric

OUTCOME	OUTCOME TITLE	LEVEL OF ACHIEVEMENT					
		1	2	3	4	5	6
16	Communication	B	B	B	B	E	
17	Public Policy	B	B	E			
18	Business & Public Admin	B	B	E			
19	Globalization	B	B	B	E		
20	Leadership	B	B	B	E		
21	Teamwork	B	B	B	E		
22	Attitudes	B	B	E			
23	Lifelong Learning	B	B	B	E	E	
24	Professional & Ethics	B	B	B	B	E	E

Number of Programs Reporting *All* of the Outcome Fulfilled by *All* of their BS-Level Graduates

OUTCOME	OUTCOME TITLE	LEVEL OF ACHIEVEMENT					
		1	2	3	4	5	6
1	Mathematics	10	10	9	2	0	0
2	Natural Sciences	10	10	9	2	0	0
3	Humanities	6	5	3	2	0	0
4	Social Sciences	7	4	2	1	0	0
5	Material Science	9	7	5	2	0	0
6	Mechanics	10	9	9	7	0	0
7	Experiments	9	9	9	8	2	0
8	Problem Recognition/Solving	10	9	9	2	1	0
9	Design	9	10	9	8	7	0
10	Sustainability	6	3	2	2	0	0
11	Contemporary Issues/History	7	3	2	1	0	0
12	Risk & Uncertainty	7	3	2	1	0	0
13	Project Management	9	9	6	0	0	0
14	Breadth in CE	10	10	9	9	0	0
15	Tech Specialization	9	7	5	3	0	0

Number of Programs Reporting *All* of the Outcome Fulfilled by *All* of their BS-Level Graduates

OUTCOME	OUTCOME TITLE	LEVEL OF ACHIEVEMENT					
		1	2	3	4	5	6
16	Communication	10	10	8	8	2	0
17	Public Policy	5	4	0	0	0	0
18	Business & Public Admin	7	4	0	0	0	0
19	Globalization	5	3	1	0	0	0
20	Leadership	9	7	4	0	0	0
21	Teamwork	9	8	7	2	0	1
22	Attitudes	7	7	0	0	0	0
23	Lifelong Learning	10	10	9	0	0	0
24	Professional & Ethics	10	10	7	5	0	0

Number of Programs Reporting *All* of the Outcome Fulfilled by *All* of their MS-Level Graduates

OUTCOME	OUTCOME TITLE	LEVEL OF ACHIEVEMENT					
		1	2	3	4	5	6
7	Experiments					4	
8	Problem Recognition/Solving				6		
12	Technical Specialization		9	9	9	5	

Technical

5. Material Science
6. Mechanics
7. Experiments
8. Problem recognition & solving
9. Design
10. Sustainability
11. ~~Contemporary issues &~~
historical perspectives
12. Risk and Uncertainty
13. Project management
14. Breadth in CE areas
15. Technical specialization

Professional

16. Communication
17. Public Policy
18. Business &
public administration
19. Globalization
20. Leadership
21. Teamwork
22. Attitudes
23. Lifelong learning
24. Professional &
ethical responsibility

Foundational

1. Mathematics
2. Natural sciences
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Concluding Comments

- **The BOKEdFC is developing**
 - case studies focused on “challenging” outcomes”
 - recommendations for improving the BOK
- **Implications for Structural Engineering**

CURRICULA OF THE FUTURE WILL EMPHASIZE:

 - technical “**BREADTH**” (along with math, science, humanities, social science, and professional practice breadth) at the baccalaureate level.
 - technical “**DEPTH**” at the post-baccalaureate level.

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Civil engineering is a demanding field that requires a broad knowledge base and combinations of skills to practice successfully as a professional.

The purpose of the *Civil Engineering Body of Knowledge for the 21st Century, Second Edition* is to define

1. **What** are the knowledge, skills, and attitudes needed to enter into professional practice,
2. **How** can the Body of Knowledge be fulfilled by tomorrow's aspiring engineers, and
3. **Who** should guide the learning of the engineering student and engineer intern.



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Closing Thought

“Our greatest obligation to our [future civil engineering professionals] is to prepare them to understand and to deal effectively with the world in which they will live and not with the world we have known or the world we would prefer to have.”

**- Grayson Kirk (1903-1997)
Educator**