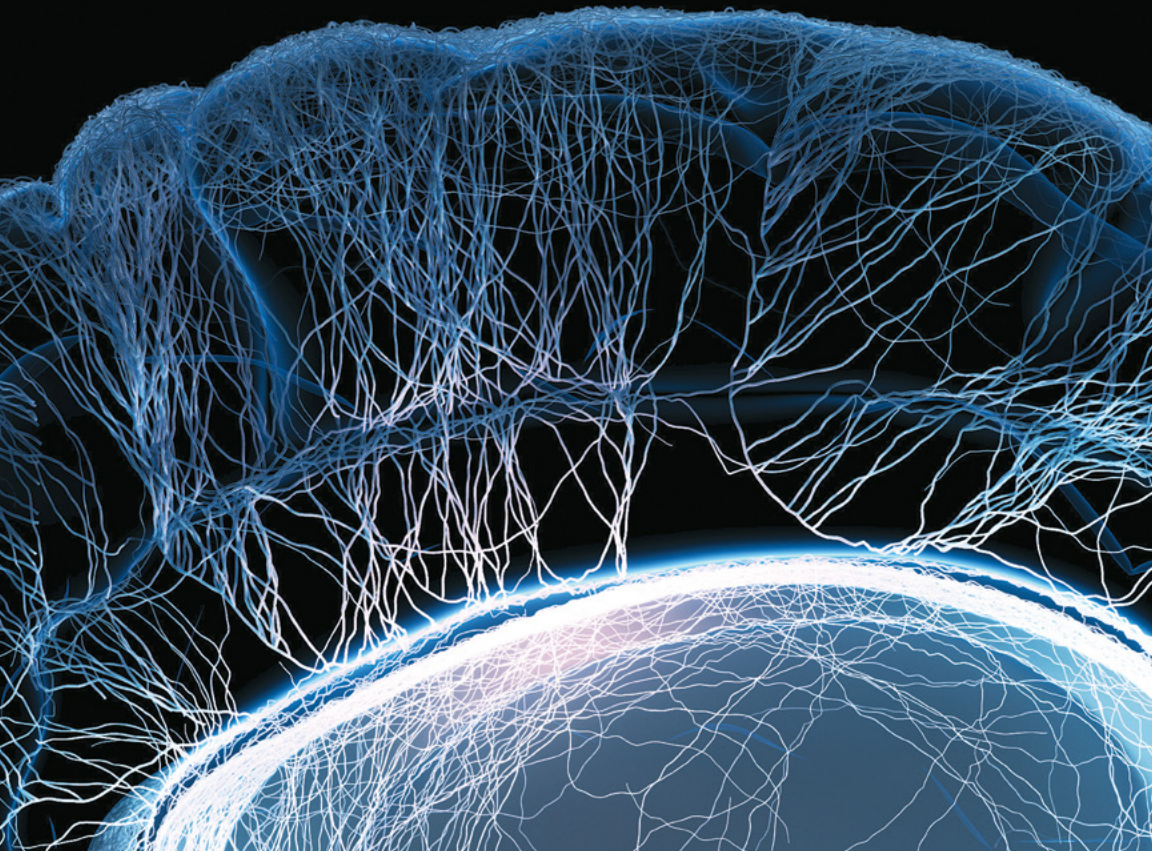
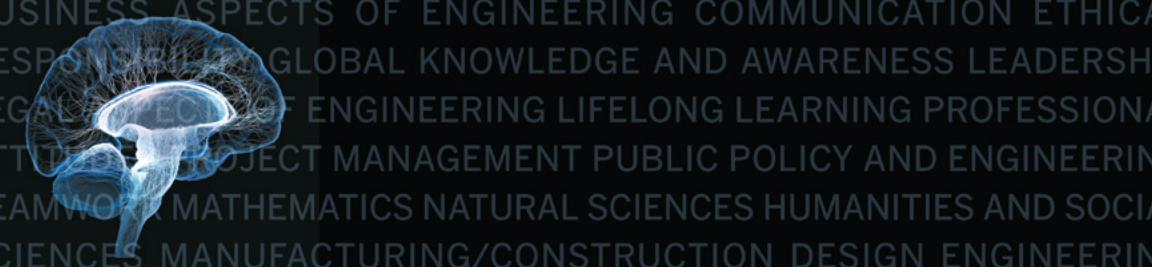


What Makes a PE?

*The Attributes and Capabilities of
Professional Engineers*





What traits are necessary to succeed in a career as a professional engineer?

In an effort to define the knowledge, skills, and attitudes required for the practice of engineering as a professional engineer in responsible charge of engineering activities that may impact public health, safety, and welfare, NSPE has published the first edition of the *Professional Engineering Body of Knowledge*.

Regardless of whether you're a high school student considering an engineering career, an engineering student, or a practicing engineer, and regardless of your chosen discipline, the 30 capabilities and 13 key attributes in the *Professional Engineering Body of Knowledge* provide practical career guidance.

By developing these attributes and capabilities, you'll be taking a very important step toward a successful engineering career.

THE PROFESSIONAL ENGINEER OF THE FUTURE

Today's professional engineers certainly need attributes similar to the ones that made PEs of the past successful. But today's PEs also face unique challenges and will need the following key attributes to remain relevant:

- Analytical and practical; tactics, policies, and procedures in projects and other roles;
- Thorough and detail-oriented in design;
- Creative and innovative;
- Communicative;
- Knowledgeable about the application of sciences and mathematics;
- Thoroughly knowledgeable in a selected field of engineering and conversant in related technical fields;
- Knowledgeable about and skillful in business and management;
- Able to provide leadership with the ability to effect change in strategies, tactics, policies, and procedures in projects and other roles;
- Professional and positive attitude;
- Aware of societal and historical considerations in the global context;
- Aware of and compliant with relevant laws, regulations, standards, and codes;
- Licensed as a professional engineer and knowledgeable about engineering ethics and applicable codes of professional conduct; and
- Dedicated to lifelong learning.

ENGINEERING BODY OF KNOWLEDGE CAPABILITIES

The *Professional Engineering Body of Knowledge* contains 30 capabilities categorized in three areas: Basic or Foundational, Technical, and Professional Practice. The full Engineering BOK is intended to apply across the engineering profession, for each engineering discipline and employment situation. (The capabilities are featured in Appendix D of the report.)

Basic or Foundational

- 1. Mathematics >>** Mathematics enables engineers to use logic and calculations to work on practical problems.
- 2. Natural Sciences >>** Physical and biological sciences are the foundation of engineering.
- 3. Humanities and Social Sciences >>** The humanities examine the “what” of human values and the societal sciences the “how.”

Technical

- 4. Manufacturing/Construction >>** Manufactured products and constructed infrastructure are a major factor in determining the quality of life.
- 5. Design >>** Design is the means by which ideas become reality and which enables useful products and projects to be manufactured and constructed.
- 6. Engineering Economics >>** Economic analysis is essential in comparing alternatives.

- 7. Engineering Science >>** Engineering science is the bridge from pure science to engineering.
- 8. Engineering Tools >>** Engineers must keep abreast of the tools being used and developed in their area of expertise.
- 9. Experiments >>** Experiments provide insight into cause and effect by demonstrating what outcome occurs when a particular factor is changed.
- 10. Problem Recognition and Solving >>** The essence of engineering is recognizing and solving problems.
- 11. Quality Control and Quality Assurance >>** The measure of a project's quality is how well the results conform to all requirements.
- 12. Risk, Reliability, and Uncertainty >>** Risk, reliability, and/or uncertainty assessment is essential in engineering practice.
- 13. Safety >>** In manufacturing, safety is an integral component of design to ensure the safety of workers and consumers of products.
- 14. Societal Impact >>** An understanding of societal context is a critical aspect of most engineering activities.
- 15. Systems Engineering >>** Systems engineering seeks to make the best use of personnel, material, equipment, and energy.

16. Operations and Maintenance >> The safe, reliable, and cost-effective operation and maintenance of engineered systems and works requires engineering supervision.

17. Sustainability and Environmental Impact >> Engineers should focus on sustainable materials, processes, systems, and resource and energy use.

18. Technical Breadth >> In order to function as members of multidisciplinary teams, engineers need to have a working knowledge of other disciplines.

19. Technical Depth >> As technology advances, technical depth in a given field becomes more important.

Professional Practice

20. Business Aspects of Engineering >> Engineers work within a business framework and must recognize the related opportunities and constraints.

21. Communication >> An engineer needs to communicate effectively with technical and nontechnical audiences.

22. Ethical Responsibility >> Ethical values and principles manifest themselves in all engineering practice areas.

23. Global Knowledge and Awareness >> The effectiveness of engineers will increasingly be determined by their understanding of global developments and influences.

24. Leadership >> The engineer who is in a leadership mode moves a team or group into new areas.

25. Legal Aspects of Engineering >> Engineers working on projects must be aware of and comply with applicable local, state, and federal laws and regulations.

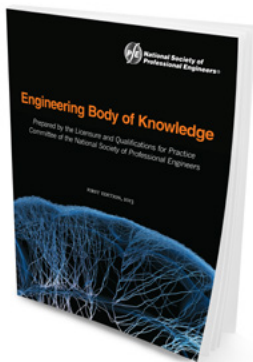
26. Lifelong Learning >> Lifelong learning is necessary in order to remain current in the midst of changes in knowledge, technology, and tools.

27. Professional Attitudes >> An engineer's attitudes are important components of professionalism.

28. Project Management >> Project management is the process by which an engineering organization meets deliverable, schedule, and budget requirements and manages human resources.

29. Public Policy and Engineering >> Although public policy affects the various types of engineering practice in different ways, all engineers are impacted.

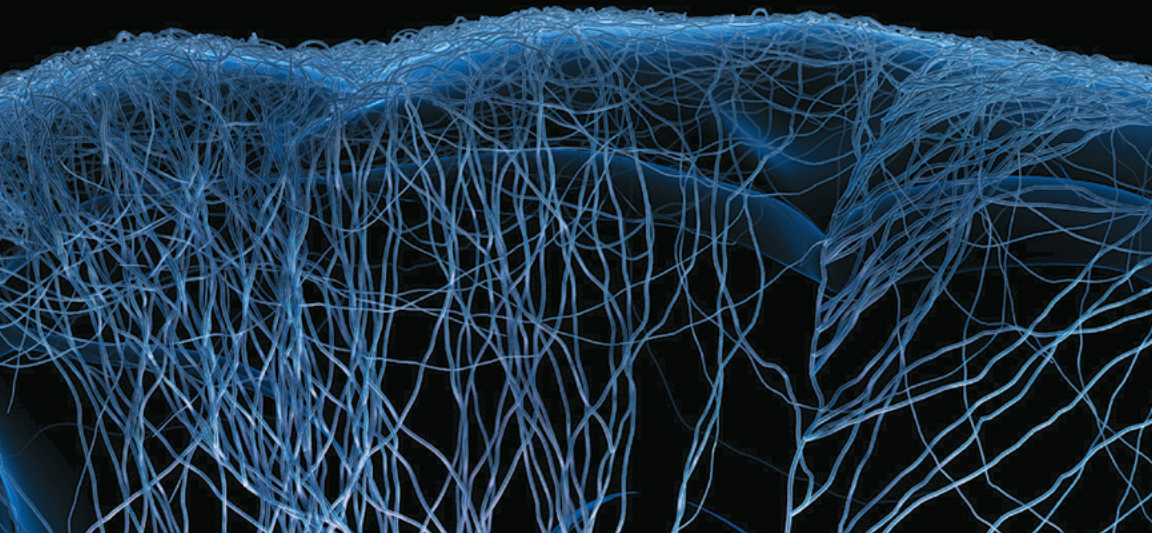
30. Teamwork >> Engineers serve on teams and must function effectively as team members.



Read the full *Professional Engineering Body of Knowledge*

DOWNLOAD FOR FREE HERE ▶
www.nspe.org/ebok

Submit comments on the *Professional Engineering Body of Knowledge* to Arthur Schwartz at aschwartz@nspe.org.



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