

Licensure and Certification: What this Means for the Environmental Engineer?

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With information obtained primarily from the American Academy of Environmental Engineers & Scientists (AAEES) & National Council of Examiners for Engineering and Surveying (NCEES)

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Information Sources

The purpose of this educational module is to allow engineering educators to explain to environmental engineering students the difference between licensure and certification. The module is intended for faculty members to become part of a course, e.g., Capstone Design, Professionalism and Ethics, and even first year engineering courses.

Information contained in this 25-page educational module was primarily obtained with permission from the web sites of the following two professional organizations:

- American Academy of Environmental Engineers & Scientists (AAEES)
<http://www.aee.net/>
- National Council of Examiners for Engineering and Surveying (NCEES)
<http://ncees.org/>

When noted, additional information was obtain from:

- American Society of Civil Engineers (ASCE) <http://www.asce.org/>

Learning Objectives

After completing this lesson, students will:

- 1) understand the importance and value of licensure and certification for environmental engineers
- 2) be able to differentiate between licensure and certification
- 3) understand the steps and timing associating with obtaining licensure and certification

Supplementary reading materials for students or faculty includes:

Graduating Engineer, Licensed and Certified, John Edwards

<http://www.graduatingengineer.com/articles/20060919/Licensed-and-Certified>

Engineering Credentials, Council of Engineering and Scientific Specialty Boards, National Society of Professional Engineers, Revised: January, 2012. <http://www.nspe.org/resources/pdfs/Licensure/Resources/8-2-3-LQPC-Recommendation-3-EngineeringCredentialsTutorial-2011-FINAL-APPROVED-2012-Jan7.pdf>

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Why Become Licensed & Certified?

Obtained with permission from the American Academy of Environmental Engineers and Scientists (<http://www.aeee.net/>)

- The American Academy of Environmental Engineers & Scientists (AAEES) states that today's complex engineering projects demand more than just a general knowledge of engineering practice - they require the special expertise that is gained only through years of experience. If you are a licensed engineer with at least eight years of full-time environmental engineering experience, the next logical step in your career development is to be board-certified in your specialty and to become a Board Certified Environmental Engineer (BCEE).
- The BCEE title is recognized as a premium credential (i.e., a badge of recognition) awarded to experienced professionals who have demonstrated expertise in one or more areas of specialization.

What is Licensure?

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<http://ncees.org/>

Licensure

- Professional licensure protects the public by enforcing standards that allow qualified individuals to practice who have met specific qualifications in education, work experience, and exams.
- In the U.S., licensure for the engineering and surveying professions is regulated by states. Candidates interested in pursuing licensure are encouraged to check the requirements in the state or territory where they plan to practice, as the requirements vary.
- Specific state requirements can be found at:
http://www.ncees.org/Licensing_boards.php

Why Obtain Engineering Licensure?

Obtained with permission from the National Council of Examiners for Engineering and Surveying (NCEES)

<http://ncees.org/>

- Licensed engineers are a select group. Because the requirements are stringent and because there are some exemptions that allow engineers to work under the supervision of a P.E., not all engineers become licensed. Those who do achieve licensure, however, enjoy the professional benefits that accompany this distinction.

Licensure – In class Activity

- Research and discuss what the requirements for licensure are in your home state.
- Select a second state someone in your class has worked in, or lived in ... are there differences in the requirements for licensure?

Steps to Become a P.E. (i.e., become licensed)

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Each state licensing board has its own laws regarding engineering licensure, however, there is a general four-step process for licensure candidates:

- **Step 1)** Earn a degree from an ABET-accredited engineering program.
- **Step 2)** Pass the F.E. exam.
- **Step 3)** Gain acceptable work experience (typically a minimum of four years). In most cases, this must be completed under the supervision of a P.E.
- **Step 4)** Pass the P.E. exam in the appropriate discipline (most states now have tests in environmental engineering).
- **Step 5)** Many states require ongoing continuing education.

What Tasks would I Perform as a Licensed Engineer?

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As a P.E., you would be able to perform certain tasks, such as:

- Stamp and seal designs
- Bid for government contracts
- Be principal of a firm
- Perform consulting services
- Offer services to the public

What is Certification?

Obtained with permission from the American Academy of Environmental Engineers and Scientists
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- Specialty certification is a recognized mechanism providing independent testimony to the expertise possessed by individuals.
 - Those certified by the American Academy of Environmental Engineers and Scientists (AAEES) have proven that they possess specific expertise in one or more of the environmental engineering specialties recognized by the Academy.
- Benefits to *individual environmental engineers* of the Academy's specialty certification include independent testimony to capability in one or more of seven environmental engineering specialties.
- Benefits to *consulting engineering firms* of the Academy's specialty certification include marketing, professional development.
- Benefits to *public utilities and private industry* of the Academy's specialty certification include screening potential employees and consulting engineers.

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Why Obtain Specialty Certification?

(according to The American Society of Civil Engineers (ASCE))

1. Respected expertise
2. Validated competence
3. Heightened marketability
4. Advance your career
5. Expand your professional network
6. Heightened recognition
7. Increase your credibility
8. Polish your leadership skills
9. Increase your knowledge base
10. Increase your earnings potential
11. Global market place recognizes & values certification

Certification – In class Activity

- Find at least one specialty certification for engineers that is not administered by AAEEES.
- How does that process work to become certified?
- Who do you think would want that certification and why?

Steps to Become Certified with AAEES

Obtained with permission from the American Academy of Environmental Engineers and Scientists (<http://www.aee.net/>)

- To become a **Board Certified Environmental Engineer (BCEE)**, you must be a licensed professional engineer (i.e., have your P.E.), have at least eight years of full-time environmental engineering and/or teaching experience.
- Qualifying experience includes active and responsible participation and involvement in design, management, research, administration, or teaching primarily in one or more fields of environmental engineering.
- You must take a written exam and sit for a Peer Review. If you have more than 16 years of work experience, you may request a waiver of the written exam.
- You then become certified as a BCEE and must maintain your engineering practice and ongoing professional education
- You may also become a **Board Certified Environmental Engineer Member (BCEEM)**. This does not require you obtain a P.E.; however, the Academy now only certifies BCEEMs “by eminence.” BCEEMs need to have at least 20 years of experience and be very well known and respected in the discipline of environmental engineering.

What Specialties are Available?

Obtained with permission from the American Academy of Environmental Engineers and Scientists (<http://www.aeee.net/>)

Specialty Certification of experienced, licensed professional engineers by the American Academy of Environmental Engineers & Scientists has identified those with proven specialty capabilities in the following eight specialties of environmental engineering:

1. Air Pollution Control
2. Environmental Sustainability
3. General Environmental Engineering
4. Hazardous Waste Management
5. Industrial Hygiene
6. Radiation Protection
7. Solid Waste Management
8. Water Supply and Wastewater Engineering

Those certified by the AAEEES are awarded the title “Board Certified Environmental Engineer (BCEE). Maintenance of competence is assured by an annual recertification program that includes mandatory continuing professional development.

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I'm not an Engineer!

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(<http://www.aeee.net/>)

- People may seek certification as a **Board Certified Environmental Scientist (BCES)**. Each person seeking certification as a Board Certified Environmental Scientist must possess certain pre-requisites including:
 - 1) Be engaged in environment science,
 - 2) A baccalaureate degree or higher in environment science or other science field acceptable to the Academy's BCES Certification Board,
 - 3) Experience in environment science subsequent to receipt of the college degree, and
 - 4) Good moral character and high ethical integrity.
- **Available Specialties include:** 1) Air Resources, 2) Environmental Biology, 3) Environmental Chemistry, 4) Environmental Microbiology, 5) Environmental Toxicology, 6) Groundwater and the Subsurface Environment, 7) Surface Water Resources, and 8) Sustainability Science

Overall Timing

- **Step 1)** Earn a degree from an ABET-accredited engineering program.
- **Step 2)** Pass the F.E. exam.
- **Step 3)** Gain acceptable work experience (typically a minimum of four years). In most cases, this must be completed under the supervision of a P.E. Document your design experience. (a slide at the end provides the ABET definition of engineering design)
- **Step 4)** Pass the P.E. exam in the appropriate discipline (most states now have tests in environmental engineering). **This means you are licensed.**
- **Step 5)** Work an additional 8-10 years beyond your BS degree.
- **Step 6)** Sit for and pass a specialty examination. **This means you obtain a specialty certification.**
- **Step 7)** Complete and document ongoing continuing education.

Specialty Certification -In-class Activity

- How many faculty in your department are licensed professional engineers? How many are certified as a BCEE, BCEEM, or BCES?
- Pick a leading environmental engineering consulting firm and go to that website.
- How many engineers are P.E.s (in other words, licensed)?
- How many engineers are AAEEES specialty certified (in other words, they are BCEEs or BCEEMs)?
- Are there any scientists at the firm that are certified as a Board Certified Environmental Scientist (BCES)?

Licensure vs Certification: Out-of-Class Assignment or Quiz

1. What is the primary difference between licensure and specialty certification for an environmental engineer in terms of how they affect your career?
2. Which one takes longer to achieve, licensure or specialty certification?
3. Can you be specialty certified as a BCEE if you do not have a P.E.? (if your answer is no, are there other routes to certification by the AAEEES?)
4. Who regulates the BCEE versus the P.E. in California? How about in Missouri? How about in the state you are now studying in?

Other Certifications for Environmentally-related Professionals

Obtained from <http://www.asce.org/>

ASCE Academies offer a post-licensure credential to civil engineers to help distinguish themselves in the fields of water resources, geotechnical, coastal, ocean, port, and navigation engineering. [Note, that there are other certifications issues by other organizations.]

1. Obtain a Professional Engineering (P.E.) License
2. Obtain your Master's Degree (or 30 additional hours of coursework)
3. Obtain at least 10 years of work experience
4. Pass an Oral Examination (may be waived)

Want More Information?

- American Academy of Environmental Engineers & Scientists (AAEES) <http://www.aees.org/>
- National Council of Examiners for Engineering and Surveying (NCEES) <http://ncees.org/>
- American Society of Civil Engineers (ASCE) <http://www.asce.org/>

ABET Definition of Engineering Design

ABET defines **engineering design** as “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 science and mathematics and engineering sciences are applied to convert resources optimally to meet a stated objective. Among the fundamental elements of the design process are the establishment of objectives and criteria, synthesis, analysis, construction, testing and evaluation.

The engineering design component of a curriculum must include most of the following features: development of student creativity, use of open ended problems, development and use of modern design theory and methodology, formulation of design problem statements and specification, consideration of alternative solutions, feasibility considerations, production processes, concurrent engineering design, and detailed system description. Further it is essential to include a variety of realistic constraints, such as economic factors, safety, reliability, aesthetics, ethics and social impact.

Obtained from: <http://www.me.unlv.edu/Undergraduate/coursenotes/meg497/ABETdefinition.htm>

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American Academy of Environmental Engineers & Scientists (AAEES)

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The American Academy of Environmental Engineers and Scientists is dedicated to excellence in the practice of environmental engineering and science to ensure the public health, safety, and welfare to enable humankind to co-exist in harmony with nature. The Academy is a group of highly qualified professional engineers and scientists who have imposed self-testing and review for entry qualification. Each Board Certified Environmental Engineer or Board Certified Environmental Engineering Member, have not only the standard prerequisites for specialty certification, but also has passed written and oral examinations and reviews by an admission panel of the Academy. The Academy is also an active participant in the accreditation of environmental engineering curricula. Through this process, the Academy ensures that educational standards are responsive to the needs of the professional and that tomorrow's engineers will meet the needs of the profession.

National Council of Examiners for Engineering and Surveying (NCEES)

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<http://ncees.org/>

The National Council of Examiners for Engineering and Surveying (NCEES) is a national nonprofit organization dedicated to advancing professional licensure for engineers and surveyors. It develops, administers, and scores the examinations used for engineering and surveying licensure in the United States. It also facilitates professional mobility and promotes uniformity of the U.S. licensure processes through services for its member licensing boards and licensees. These services include the records program, study materials, credentials evaluations, exam administration, and more.

American Society of Civil Engineers (ASCE)

obtained from : <http://www.asce.org/>

The American Society of Civil Engineers (ASCE) represents more than 140,000 members of the civil engineering profession worldwide and is America's oldest national engineering society. It's mission is to provide essential value to our members and partners, advance civil engineering, and serve the public good (obtained from ASCE web site, www.asce.org)