Professional Engineering Licensure in the U.S.

ENGT-2000
Professional Development
First, what is a professional engineer?

• A professional engineer (P.E.) is an individual who is licensed to practice engineering in a particular state or US territory after meeting all requirements of the law. To practice in multiple states or territories, the P.E. must be licensed in each state in which he or she wishes to practice.
WHO is a Professional Engineer?

Public expectations
The public expects individuals who practice engineering to possess certain characteristics.

- Knowledge & Aptitude
- Ethical Responsibilities
- Professionalism
Professional Licensure

Product of collaboration between Industry, Government and Education

ABET - Accreditation Board for Engineering and Technology
NCEES - National Council of Examiners for Engineering and Surveying
State Role in Licensure

Professional Engineering Licensure in the USA is Controlled by Each State
State Role in Licensure

Why do states license engineers?

- To protect the health, safety and welfare of the public by ensuring that certain providers of engineering services meet established standards of education, experience, competence and character
- To provide a legally recognized credential to enable the public to distinguish between qualified and unqualified practitioners
Why Licensure?

- Protects public safety and welfare, and …
- Sets standards for the engineering profession
- Provides a mechanism for measuring individual accomplishment – career growth
- Delineates area(s) of competency
- Allows a basis for transportability
History of Licensure in the U.S.

1907 – Wyoming was the first to enact engineering licensure laws
   – The creation of this law was generated because of the many non-professionals practicing engineering and surveying.

1922 – The American Association of Engineers (which later became the National Society of Professional Engineers) put forth a platform for engineering that included the "passage of an engineers registration law in every state and the enforcement of existing registration laws."
History of Licensure in the U.S.

1934 – The National Society of Professional Engineers is formed, with the membership requirement of being a professional, licensed engineer. At the time, only 28 states had engineering registration laws enacted.

1940 – Between 1935 and 1940, 17 additional states adopted engineering registration laws, partly through the efforts of NSPE members.

1947 – Montana was the last of the 48 states to enact a licensure program.
History of Licensure in the U.S.

By 1950, all states, plus Alaska, Hawaii, the District of Columbia, and Puerto Rico had adopted licensing laws of some kind.

Today, all U.S. states and jurisdictions have laws regulating the practice of engineering and surveying.

- Each state and jurisdiction has a licensing board (68 state and territorial licensing boards)
- The National Council of Examiners for Engineering and Surveying (NCEES) role is to assist the licensing boards
Why Become a Licensed PE?

**Recognition** - “P.E.” instantly says you’re experienced, knowledgeable, and accountable.

**Growth** - Engineering positions at all levels of industry and government increasingly require licensure.

**Authority** - As a P.E., you can consult in private practice. Without it, you don’t have the same opportunity.

**Mobility** - Earning your P.E. license in one state allows you to more easily apply for licensure in other states—a process known as *comity licensure*.

**Money** - Salary studies show that as a P.E., you can expect to earn significantly more throughout your career.
Licensure vs. Certification

Don’t confuse licensure with certification:

- Many businesses and professional organizations offer voluntary certification programs that attest to an individual’s expertise in certain knowledge areas.

- Some certifications are vendor specific - Cisco (CCNA), Microsoft (MCSE), etc.

- Others are vendor neutral – ASQ (Quality Engineer), IEEE Computer Society (CSDP), American Institute of Constructors (CPC).
Licensure vs. Certification

What are the similarities and differences between licensure and certification?

– Both require education, experience and testing
– Each results in the award of a credential attesting to an individual’s knowledge, skills and abilities
– Both provide procedures for disciplining credential holders for illegal, unprofessional or unethical practices
Licensure vs. Certification

What are the similarities and differences between licensure and certification?

- **Certification** is generally voluntary
- **Licensure** is a privilege granted by state and territorial legislatures and is a legal requirement to practice as an engineer
Basic Steps to Licensure

While each state has their own rules and regulations, there are consistent basic steps to licensure applicable to all states.
Steps to Professional Licensure

Typical milestones to becoming licensed P.E.

1. **Education**: Bachelor’s degree in engineering from an Accreditation Board for Engineering and Technology (ABET) approved university engineering program*

2. **Examination**: Passing the Fundamentals of Engineering (FE) exam – Engineering Intern or Engineer-In-Training

3. **Experience**: Generally 4 years (3 with an advanced degree) work experience under the direct supervision of a licensed P.E. – times vary by jurisdiction*

4. **Application**: Apply to a state to take the PE Exam

5. **Second Examination**: Passing the Principles and Practice of Engineering (PE) Exam

* variations in the types and levels of education and experience are accepted in some states
Steps to Professional Licensure

ABET Accredited Engineering Bachelor of Science Degree [or substantially equivalent engineering degree]

FE Exam

Pass

Engineering Intern

4* Years of Acceptable Experience

PE Exam

“Licensed Professional Engineer”

Yes

Mandatory Continuing Professional Competency

No

Inactive

Pass

Fail

Fail

*Note: The number of years of acceptable experience depend on the academic career and highest earned degree.
The ETAC Conundrum

- States that admit ABET-ETAC graduates w/o additional academic criteria:
  Alaska  Hawaii  New Hampshire  Oklahoma  Washington
  Arizona  Idaho  New Jersey  Oregon  Wisconsin
  California  Maine  New Mexico  Pennsylvania  West Virginia
  Colorado  Maryland  New York  South Dakota  Texas
  Connecticut  Massachusetts  North Carolina  Ohio
  Delaware  Montana  North Dakota  Vermont  Georgia
  Nevada  Virginia

- States that require ABET-ETAC grads to submit transcripts and work experience for review:
  Florida  Indiana  Minnesota  South Carolina

- States that require ABET-ETAC grads to obtain an MS degree from an Institution that has an ABET-EAC undergraduate program:
  Alabama  Iowa  Louisiana  Missouri  Arkansas  Kansas  Michigan
  Tennessee  Illinois  Kentucky  Mississippi  Utah

- States that do not recognize ABET-ETAC (CET) graduates:
  Nebraska  Rhode Island  Wyoming
State Laws and Regulations

All U.S. states have licensure boards charged with administering the operational, investigative, and enforcement provisions of their respective state laws

Some states include special requirements, such as:

- Proficiency in a particular field (i.e., seismic design in California, permafrost considerations in Alaska)
- Reputation (Good Character)
- References
- Proficiency in English (Some States)
“Engineer” Restrictions

Every state (except Washington) mandates that only licensed engineers may use the title “professional engineer”

Half of the states restrict the use of the title “engineer” solely to individuals licensed by the state
Comity vs. Reciprocity

- **Comity**: Accepting the status of engineers licensed in other states, regardless of whether the state in question does the same.
  - Comity is requirements-based

- **Reciprocity**: An agreement between two states that allows each state to accept the licensure status of the other state’s licensed engineers (an equal exchange).
  - Reciprocity is agreement-based

- All states have some comity provisions in their licensure laws, most allow comity if the applicant meets the licensure requirements in effect at the time the PE obtained the license from the primary jurisdiction

- A few border states have reciprocity agreements with Canada and Mexico
National Council of Examiners for Engineering and Surveying (NCEES) – the organization that includes all state engineering licensure boards – created a draft model state licensure law in order to “present to the states a sound and realistic guide that will provide greater uniformity of qualifications for licensure, to raise these qualifications to a higher level of accomplishment, and to simplify the interstate licensure of engineers”

Model law provides a national standard which addresses education, experience and testing practices

Model law establishes a Council Records Program to address comity

Model laws are not accepted by all states
Roadblocks and Hurdles

Firm Ownership

- Many state laws require engineering firms that contract with public entities to have a presence (office) within the state or a corporate license to practice engineering in the particular state.

- Ownership is an issue in some states, some states require a certain percentage of firm owners to be licensed engineers.
Emerging Issues

Bachelors degree plus 30 credit hours of education is being considered as a requirement for licensure by some entities. This evolving issue is controversial.

NCEES new Model Law requires:

- Earn a bachelor’s degree in engineering from an EAC/ABET-accredited program.
- Gain four years of acceptable engineering work experience.
- Pass the FE and PE exams.
- Maintain a clean disciplinary record.
Emerging Issues

Continuing Education Requirements

– Annual professional development requirements vary from state-to-state
– More stringent requirements are raising barriers to licensure renewals
– The debate in the U.S. over professional development mandates continues
Despite consistent concepts and similarities among state licensure laws, the U.S. has not established a countrywide licensure program and is not likely to do so in the foreseeable future.

Best advice for anyone interested in engineering licensure is to contact the board of licensure in the particular state of interest.
Ohio Board of Registration

http://www.peps.ohio.gov/
Ohio Revised Code

Chapter 4733 of the Ohio Revised Code
  - Detailed laws and rules for professional engineers and surveyors in Ohio

State Board of Registration for Professional Engineers and Surveyors
  - Created in 1933 to administer ORC 4733
Ohio Revised Code

From Ohio R.C. section 4733.03

“"A state board of registration for professional engineers and surveyors is hereby created to administer this chapter. The board shall consist of four professional engineers, at least one of whom also is a professional surveyor, and one professional surveyor. Members shall be appointed by the governor, with the advice and consent of the senate.”
The FE Test Process

Eligible for the FE Exam if:
- You have graduated
- Currently enrolled in your last two semesters of school

Four windows annually
- January-February
- April-May
- July-August
- October-November

Register directly with the NCEES
The FE Test

- Tests are 6 hours with a tutorial & optional break
- Closed book with an electronic reference provided
- Computer based 110 randomized questions
- SI (Metric) & US Customary units used
- CET’s take the Civil exam
- CSET’s and EET’s take the Electrical & Computer exam
- MET’s take the Mechanical exam
- Results within two weeks
- Scores are normalized for question degree of difficulty
- Take it as many times as needed until you pass
## The FE Test – Civil Subjects

<table>
<thead>
<tr>
<th>Subject</th>
<th>No. of Questions</th>
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<tbody>
<tr>
<td>1. Mathematics</td>
<td>7-11</td>
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<tr>
<td>2. Probability and Statistics</td>
<td>4-6</td>
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<td>3. Computational Tools</td>
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<td>4. Ethics and Professional Practice</td>
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<td>5. Engineering Economics</td>
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<td>6. Statics</td>
<td>7-11</td>
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<td>7. Dynamics</td>
<td>4-6</td>
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<tr>
<td>8. Mechanics of Materials</td>
<td>7-11</td>
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<td>10. Fluid Mechanics</td>
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<td>11. Hydraulics and Hydrologic Systems</td>
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<td>12. Structural Analysis</td>
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<tr>
<td>13. Structural Design</td>
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<tr>
<td>14. Geotechnical Engineering</td>
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<td>15. Transportation Engineering</td>
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<td>16. Environmental Engineering</td>
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<td>17. Construction</td>
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<td>18. Surveying</td>
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<td>5. Properties of Electrical Materials</td>
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<tr>
<td>6. Engineering Sciences</td>
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<tr>
<td>7. Circuit Analysis (DC &amp; AC)</td>
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<td>8. Linear Systems</td>
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<td>9. Signal Processing</td>
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<tr>
<td>10. Electronics</td>
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<td>11. Power</td>
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<td>8. Dynamics, Kinematics &amp; Vibrations</td>
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<tr>
<td>12. Thermodynamics</td>
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<td>13. Heat Transfer</td>
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<tr>
<td>14. Measurement, Instrumentation &amp; Controls</td>
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</tr>
<tr>
<td>15. Mechanical Design &amp; Analysis</td>
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Professional Engineering Societies

- National, State & Local professional engineering societies exist to promote the engineering profession
- Help to set standards for registration and ethical conduct
- Advocate and lobby for legislation regarding the correct use and development of technology and professional practice in general
- Help to shape the educational policies and efforts of future engineers
NSPE - National Society of Professional Engineers

http://www.nspe.org/
Welcome to the University of Toledo Society of Professional Engineers! This is one of the only engineering organizations that hosts students across all engineering majors. UTSPE is a resource for UT engineering students who aim to become registered as Professional Engineers (PEs). This is a path to a rewarding career in engineering.
UTSPE Student Organization

Promotes becoming a registered engineer
Coordinates with TSPE activities
Provides campus activities related to engineering and registration
Contact the organization’s advisor:

Professor Richard Springman, P.E.
richard.springman@utoledo.edu
419.530.3276
Questions?

Q & A