Steps to Professional Licensure
for Civil Engineering Graduate Student Advisory Council (CEGSAC)

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October 2017

Acknowledgments

•Special Thanks to:

- Amy Getchell for arrangements
- NCEES Speaker's Kit (Many slides in this presentation are adapted from this kit.)

http://ncees.org/education/ncees-speakers-link-and-speakers-kit/speakers-kit/

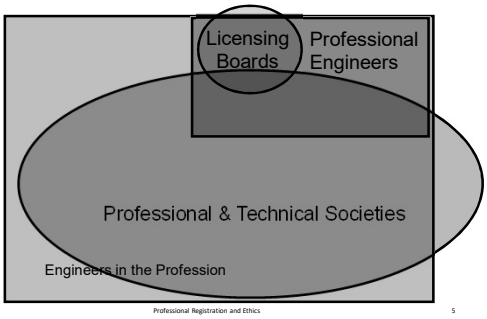
Disclaimer

The information provided by this lecture is that of Prof. Drnevich as an individual and does not represent an official position of the Indiana Registration Board for Professional Engineers or the Indiana Society of Professional Engineers.

Topics:

- ❑Engineers in the profession
- ❑Law on the Practice of Engineering
- ❑Why get licensed?
- ❑Professional Registration
- ❑Continuing Education
- ❑Ethics in Engineering Practice
- ❑Professional/Technical Societies
- ❑Concluding Thoughts
- ❑Address questions

Engineers in the profession



Into the great unknown

- ❑ Do you know what you'll do when you graduate?
- ❑ Where do you see yourself in five years?
- ❑ What about 10 years? 20? 30?

What do Employers look for?

It's about showing what you can do

- Degrees, work references, technical skills
- What if there were a universal standard that is recognized throughout the profession?

Licensure: a universal standard

- "[Engineering] licensure is crucial for career advancement and top pay." *–U.S. News & World Report*
- Think about other professions:
  - Why do we license physicians?
  - Accountants?
  - Attorneys?

State law and engineering practice

- Only a P.E. can practice engineering.
- What does that include?
  - Owning a firm
  - Consulting
  - Signing/sealing a design
  - Bidding for public money
  - Advertising your services
  - Calling yourself a professional engineer

The P.E. license

- A professional engineer
  - Has the education, experience, and technical knowledge to lead
  - Has an obligation to safeguard the public

- It works both ways:
  - You stand out in a crowd as a P.E.
  - The public is safeguarded from incompetent or unethical practice.

The licensing process

- Who oversees licensure?
- Requirements can differ by state (but not too much).
- Comity licensure: obtaining a P.E. license in additional states

Professional Registration

- Required by law for the professional practice of engineering
- Each state and territory has a "registration law"
- Implemented by a Boards of Registration
  http://ncees.org/licensing-boards/
  http://www.in.gov/pla/engineer.htm

- National Council of Examiners for Engineering and Surveying (NCEES) generate and grade the FE and PE exams used by boards of registration http://www.ncees.org

Industrial Exemption

IC 25-31-1-20 in Indiana (similar in other states)

Exempt persons

(a) An employee or a subordinate of a licensed engineer …..

(b) This chapter does not require registration for the purpose of practicing engineering by an individual or a business:

(1) on property owned or leased by that individual or business unless the engineering practice involves the public health or safety, or the health or safety of the employees of that individual or business;

(2) for the performance of engineering which relates solely to the design or fabrication of manufactured products; or

The benefits of a P.E.

- It opens career doors.
- In a stack of resumes, yours stands out.

- You serve the public–not just your employer.
- You typically earn more than peers without a P.E.

Why Get Licensed?

- Mark of a professional
- Required for practice engineering involving health, welfare, and safety of the public
- Ethics requirements
- Career development and growth
- Continuing Education
- Prestige and respect
- Flexibility
- Salary

Steps to Professional Licensure

1. Graduation from program in engineering acceptable to the Board (ABET EAC accredited)
2. Passing the Fundamentals of Engineering (FE) Exam
3. Four years of engineering practice experience
   - One year granted for MS degree in engineering
   - Two years granted for PhD degree in engineering
4. Passing the Principles and Practice (PE) Exam

Education Required for Professional Licensure

- Get an engineering degree from an EAC/ABET* accredited program
  - Mostly Bachelor's degrees
  - Some accredited Master's degrees exist

*The Engineering Accreditation Commission (EAC) of ABET accredits engineering programs

What if You Don't Have an EAC/ABET Accredited Degree?

- Most states rely on a NCEES Credentials Evaluation https://ncees.org/records/ncees-credentials-evaluations/
- Uses NCEES Engineering Education Standard https://ncees.org/engineering/ncees-engineering-education-standard/
- Ensures that your education is comparable to an accredited degree in the United States
- Other Engineering Credential Organizations are sometimes accepted
- Transcripts from school where you graduated will be required.
- Applicant may have to complete additional courses

What if You Don't Have an EAC/ABET Accredited Degree?

- Indiana requires:
  - NCEES Evaluation for all foreign degree applicants
  - May consider applicants from non EAC/ABET programs in the US See 864 IAC 1.1-2-2 http://www.in.gov/legislative/iac/iac_title?iact=864
  - Supplemental Information on coursework https://forms.in.gov/Download.aspx?id=5896
  - Additional years of experience is required.

FE exam

- Fundamentals: what you learned in college
- Computer-based exams
- Offered year-round at approved Pearson VUE test centers

FE exam format and content

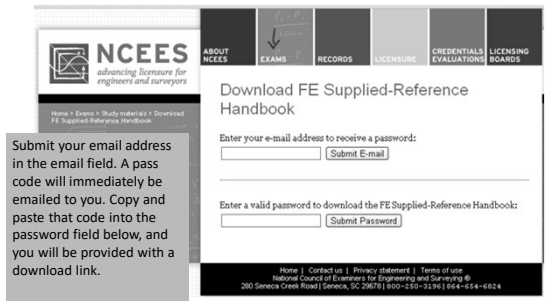
- 7 freestanding discipline-specific exams
  - –110 multiple-choice questions
- Exam specifications (what's on the exam)
  - –Available at www.ncees.org/exams
- *FE Reference Handbook*
- Practice exams

Computer-Based FE Exams

- Seven separate exams:
  - Chemical
  - Civil
  - Electrical and Computer
  - Environmental
  - Industrial
  - Mechanical
  - Other Disciplines

Downloading FE Reference Handbook

http://ncees.org/exams/study-materials/download-fe-supplied-reference-handbook/



Submit your email address in the email field. A pass code will immediately be emailed to you. Copy and paste that code into the password field below, and you will be provided with a download link.

FE Civil exam: Exam specifications

Morning (No. of Questions)

- Mathematics 7–11
- Probability and Statistics 4–6
- Computational Tools 4–6
- Ethics and Professional Practice 4–6
- Engineering Economics 4–6
- Statics 7–11
- Dynamics 4–6
- Mechanics of Materials 7–11
- Materials 4–6

Afternoon (No. of Questions)

- Fluid Mechanics 4–6
- Hydraulics and Hydrologic Systems 8–12
- Structural Analysis 6–9
- Structural Design 6–9
- Geotechnical Engineering 9–14
- Transportation Engineering 8–12
- Environmental Engineering 6–9
- Construction 4–6
- Surveying 4–6

OTHER DISCIPLINES
CBT Exam Specifications – Morning

Knowledge	Number of Questions
1. Mathematics and Advanced Engineering Mathematics	12–18
2. Probability and Statistics	6–9
3. Chemistry	7–11
4. Instrumentation and Data Acquisition	4–6
5. Ethics and Professional Practice	3–5
6. Safety, Health, and Environment	4–6
7. Engineering Economics	7–11

OTHER DISCIPLINES
CBT Exam Specifications - Afternoon

Knowledge	Number of Questions
8. Statics	8–12
9. Dynamics	7–11
10. Strength of Materials	8–12
11. Materials Science	6–9
12. Fluid Mechanics and Dynamics of Liquids	8–12
13. Fluid Mechanics and Dynamics of Gases	4–6
14. Electricity, Power, and Magnetism	7–11
15. Heat, Mass, and Energy Transfer	9–14

FE exam administration

- Approved Pearson VUE test centers
  - Many located around the country
  - Can take test at any site convenient for you
- Four, 3-month-long testing windows:
  - Jan., Feb., & Mar.
  - Apr., May, & Jun.
  - Jul., Aug., & Sep.
  - Oct., Nov., & Dec.

FE exam administration, Cont'd.

- Apply to NCEES to register for FE and FS exams (http://ncees.org/engineering/fe/)
  - Provide information
  - Pay $225 fee (To be reduced to $175 in January 2018)
- Schedule Exam with Pearson-Vue
  - Choose location (Purdue is among 7 in Indiana; many in every state to choose from)
  - Choose from dates available.
- Must take exam within one year of registering
  - Penalty for rescheduling - $50

Pearson Vue Site

- Explore the computer-based exam experience
  https://www.youtube.com/watch?v=5YbpV48rNK4

Exam Session

- 6-hour exam appointment, which includes
  - Nondisclosure agreement (2 minutes)
  - Tutorial (8 minutes)
  - Exam (5 hours and 20 minutes)
  - Scheduled break (25 minutes)
  - Brief survey

FE Exam Pass Rates

Exam	Volume	Pass rate
FE Chemical	1,055	79%
FE Civil	5,622	70%
FE Electrical and Computer	1,216	73%
FE Environmental	741	77%
FE Industrial	266	68%
FE Mechanical	3,813	80%
FE Other Disciplines	1,376	80%

Slide from President Daniels Report to Board of Trustees, Oct. 9, 2015

LICENSING EXAMS STANDOUTS

Licensing Exam	National Pass Rate	Purdue Pass Rate	Change in Purdue pass rate from FY13
Adult Gerontology Nurse Practitioner	85.7%	100%	0%
Registered Nurse	83.0%	91.1%	0%
Doctor of Audiology	63.3%	100%	0%
Fundamentals of Engineering	77.1%	93.3%	-2.7% *New electronic format*

PURDUE UNIVERSITY

From: Pres. Mitch Daniels Open Letter
(January 2017)

	National Pass Rate	Purdue Pass Rate
All Major National Exams	84%	96%
Speech, Language Pathology	85%	100%
Registered Nurse	86%	95%
Doctor of Audiology	70%	100%
Fundamentals of Engineering	76%	95.1%
# of exams Purdue beat the national pass rate: 11 of 11		

Purdue FE Exam Pass Rates

Fundamentals in Engineering Examination			
	Purdue No. Passed	Purdue % Passed	National Pass Rate
2008-2009	341	92.4%	77.4%
2009-2010	462	91.7%	76.8%
2010-2011	469	94.0%	78.0%
2011-2012	478	89.4%	75.4%
2012-2013	455	96.0%	72.3%
2013-2014	392	93.3%	77.1%[2]
2014-2015	559	95.1%	76.0%

Engineer-in-Training* (EIT)

- Once the required education is completed and the FE exam is passed, must apply to State Board for certification as an EIT.
  - Requires submitting transcripts
  - Must be certified as EIT before taking PE exam.
  - All state boards accept passed FE exam
  - Board information available at: http://ncees.org/licensing-boards/

* aka Engineering Intern (EI)

Important Points

- Optimum Time for taking FE is senior year or within a year after graduation; Don't put it off!
- Never any regrets for taking and passing it
- Encourage engineering classmates to take it
- Positive item for your resume.
- Once passing the FE exam, no expiration date

Engineering Practice Experience

Four years (or more) of engineering practice experience

- Typically starts at B.S. degree graduation
- Undergrad Co-Op or Internship may or may not be counted
- One year granted for MS degree in engineering
- Two years granted for PhD degree in engineering
- Will need licensed engineers as references

Principles and Practice (PE) Exams

(Typically taken after 4 years of engineering practice experience)

- PE Agricultural & Biological
- PE Architectural
- PE Chemical
- PE Civil
- PE Control Systems
- PE Electrical and Computer
- PE Environmental
- PE Fire Protection
- PE Industrial
- PE Mechanical
- PE Metallurgical and Materials
- PE Mining and Mineral Processing
- PE Naval Architecture and Marine Engineering
- PE Nuclear
- PE Petroleum
- PE Structural I
- PE Structural II
- PS Surveying

Comity Registration

- Registration in a given state for person registered in another state
- Special application and fees
- Applicant must meet the educational, experience, and examination requirements for registration in other state.
  - Rules for registration vary
    - Among states
    - With time that original registration occurred
  - Determination made by the Board

https://secure.in.gov/pla/2741.htm

Expedite Comity with NCEES Record

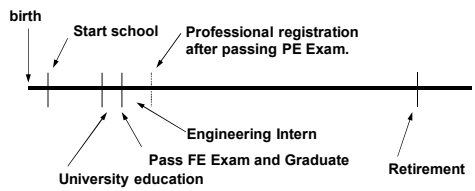
http://ncees.org/records/

NCEES Records is a service designed for engineers seeking comity licensure. One-time fee of $175, no annual fee. There is a $75 transmittal fee.

Steps for completing the Record application process:

1. Applicant creates an account
2. Applicant completion of all sections of the online application
   - Seven sections — Education, Examinations, Licensure, References, Questions for the Applicant, Experience Record, and Payment Information.
3. NCEES verifies application information
4. NCEES reviews and verifies all transcripts and responses from references and employers.
5. NCEES notifies applicant and provides a Record Number

Time line for Engineers



Note: For surveyors, the corresponding exams are the FS and PS exams.

Continuing Education

- 41 of the states now have Continuing Education requirements for maintaining licenses.
  - Typically require 24 to 30 hours per biennium for renewal of license
  - Approved activities vary, but always include courses and short courses related to the practice of engineering
  - Rules for Indiana were established in 2010 and updated in 2014

Continuing Education Question

- How does a professional acquire new knowledge and keep up with developments in the field?
- Answer: By continuing your education through
  - Self study
  - Additional coursework
  - Graduate study
  - Engaging in research
  - Continuing education courses
  - Conferences
  - Professional and technical societies

Engineering Ethics

- Engineering Ethics typically covers:
  - Code of ethics (professional and technical societies)
  - Agreements and contracts
  - Ethical versus legal
  - Professional liability
  - Public protection issues (e.g., licensing boards)

Ethical behavior

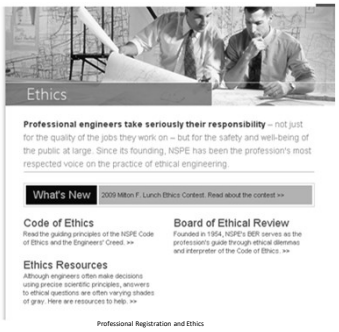
Contract among affected parties

- Unwritten understanding…
  - **Agreed behavior among individuals**
  - **Taught by our upbringing**
  - **"Gentlemen's Agreement"**
- Written Contract – defined focus
  - **Professional Code of Ethics**
  - **Established and administered by a profession**
- The Law
  - **Federal, state, and local Statutes and Rules**
  - **Administered and enforced by officials: fines and penalties**

Codes of Ethics

- Established by membership of professional societies
- Standard Format (especially among engineering organizations)
  - Preamble
  - Fundamental Canons
  - Rules of Practice
  - Professional Obligations

NSPE on Ethics www.nspe.org/ethics/



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NCEES Model Code of Ethics
In Reference Handbook

http://ncees.org/exams/study-materials/download-fe-supplied-reference-handbook/

Three Major Sections:

1) ***Licensee's Obligation to Society***
2) ***Licensee's Obligations to Employers and Clients***
3) ***Licensee's Obligations to Other Licensees***

240.15 Rules of Professional Conduct

A. Licensee's Obligation to Society

1. Licensees, in the performance of their services for clients, employers, and customers, shall be cognizant that their first and foremost responsibility is to the public welfare.
2. Licensees shall approve and seal only those design documents and surveys that conform to accepted engineering and surveying standards and safeguard the life, health, property, and welfare of the public.
3. Licensees shall notify their employer or client and such other authority as may be appropriate when their professional judgment is overruled under circumstances where the life, health, property, or welfare of the public is endangered.

Five more items

240.15 Rules of Professional Conduct

B. Licensee's Obligation to Employer and Clients

1. Licensees shall undertake assignments only when qualified by education or experience in the specific technical fields of engineering or surveying involved.
2. Licensees shall not affix their signatures or seals to any plans or documents dealing with subject matter in which they lack competence, nor to any such plan or document not prepared under their responsible charge.
3. Licensees may accept assignments for coordination of an entire project, provided that each design segment is signed and sealed by the licensee responsible for preparation of that design segment.

Four more items

240.15 Rules of Professional Conduct

C. Licensee's Obligation to Other Licensees

1. Licensees shall not falsify or permit misrepresentation of their, or their associates', academic or professional qualifications. They shall not misrepresent or exaggerate their degree of responsibility in prior assignments nor the complexity of said assignments. Presentations incident to the solicitation of employment or business shall not misrepresent pertinent facts concerning employers, employees, associates, joint ventures, or past accomplishments.
2. Licensees shall not offer, give, solicit, or receive, either directly or indirectly, any commission, or gift, or other valuable consideration in order to secure work, and shall not make any political contribution with the intent to influence the award of a contract by public authority.
3. Licensees shall not attempt to injure, maliciously or falsely, directly or indirectly, the professional reputation, prospects, practice, or employment of other licensees, nor indiscriminately criticize other licensees' work.

State Laws on Engineering Practice

- Generated by the Legislatures
- Consistent with Codes of Ethics
- Enforced by:
  - State Engineering Registration Boards
  - State Attorney General's Office
- Penalties for non-compliance
  - Fines
  - Possible loss of license

Professional and Technical Societies

- Source of new knowledge and technologies – Continuing Education
- Sense of identity to the professional
- Represents the profession to government and society
- Codes of Ethics
- Develop leadership skills
- Networking
- Other

Recommended Prof./Tech. Orgs.

- Professional Org.
  - NSPE/ISPE with local chapters and student chapters (PSPE at Purdue)
  - SWE, NSBE, etc.
- Technical Orgs.
  - Basic Founder Societies, e.g. ASABE, ASCE, ASME, ANS, IEEE, IIE, etc.
  - Specialty Societies, e.g. ASTM , ITE

National Society of Professional Engineers (NSPE)

NSPE NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS www.nspe.org

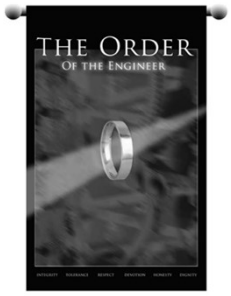
Student Membership
You qualify for a FREE NSPE national **student membership** if you are an engineering **student** enrolled full-time

NSPE **Student Membership** get the following:
- Free Resources for **Students** Looking for a job
- Deep discounts on a wide variety of publications including FE/PE Exam preparation materials

https://www.nspe.org/membership/type-membership/student-membership

Order of the Engineer

http://www.order-of-the-engineer.org/



The Order of the Engineer was initiated in the United States to foster a spirit of pride and responsibility in the engineering profession, to bridge the gap between training and experience, and to present to the public a visible symbol identifying the engineer.

Member identified by the wearing of a stainless steel ring on the small finger of the working hand.

Ceremony at Purdue in April and December before graduations

If O/E does not exist on your campus, consider establishing it

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Concluding Thoughts

- Reasons to become licensed:
  - Required by the law to practice engineering
  - Money
  - Status/Respect
  - Career Flexibility
- Licensure is a 4-step process
  - Education from ABET accredited program
  - Pass FE Exam (exam is changing to CBT in 2014)
  - Four years of experience after graduation
  - Pass the PE Exam
- Professional and Technical Societies play an important role in the professional lives of engineers.

Things you need to do:

- Obtain a broad engineering education
  - Keep in mind the topics covered in the FE Exam
- Plan to take the FE Exam
  - Apply for it at the beginning of the last semester before graduating
- Choose a job that provides qualifying work experience for the PE Exam
- Keep your resume' updated
- Prepare for and take the PE Exam at your earliest possible date

Things to consider:

- Participate in professional and technical organizations
- Continue to learn
- Careers in engineering are exciting and rewarding
- Many career paths are open to you with an engineering degree

Questions and Discussions

1. When should you start preparing for the FE? Senior year.
2. How to prepare for FE exam? Attend Chi Epsilon sessions, become familiar with the FE Reference guide, and take sample tests.
3. How many questions are on the FE? 110 Multiple choice
4. How important is FE license after one passes the FE exam? Passing the FE exam plus having the qualifying education allows for getting a EIT certificate, which is needed for sitting for the PE exam.
5. Is my EIT certification valid in any state? It is valid in all states and U.S. Territories and does not expire.

Questions and Discussions

6. What are the differences in FE to PE wait time from state to state? Several states (California, Texas, and several others have no waiting period. Most states require 4 years.
7. When compiling professional experience to go towards my eventual licensure, is there a certain format/form to use? Most states have a form for this, however, consider creating a NCEES Record http://ncees.org/records/ which is accepted by every state. Special low fee is available for people who are not already licensed.

Questions and Discussions

8. While the requirements for getting a license differ by state, once a license is received is it nationally recognized? Licensure in a given state only allows for practice in that state. Must become licensed in other states by "comity".
9. Can we use experience of other countries to get it counted for professional license? It depends on the state and experience details. State Board makes final determination.
10. Do I need to have an SE and a PE to practice structural engineering or just certain states require this? Illinois only requires a SE license. California and Hawaii require both. Seven other states allow PE's to structural engineering, but with restrictions.

Questions and Discussions

11. I got a BS degree with the specialization of CEM. Am I eligible for PE license? Yes, as long as your CEM degree is ABET EAC accredited.
12. Could you kindly confirm the relevance of exams like CMIT and FE? CMIT stands for Construction Manager in Training. Very helpful for career in construction.
13. What steps should you take during grad school to set yourself up for the PE in a few years? (Passed the FE... now what?) Use opportunities to attend technical talks, conferences, and field trips
14. If a PhD, leaning towards academia, when is the right time to take FE and PE? Take FE as soon as possible. Take PE two to four years after completing Ph.D.

Thanks for listening!

Vince Drnevich

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