Professional Registration, Ethics, and FE/FS Test Strategy

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  - Chi Epsilon, the Civil Engineering Honor Society
  - PSPE, the Purdue Society of Professional Engineers

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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, the Indiana Society of Professional Engineers, or Purdue University.
Topics:

- Professional Licensure
- Overview of FE Exam
- Ethics in Professional Practice
- Ethics on FE Exam
- FE Exam Strategies
  - Before the Exam
  - During the Exam
- Address questions
Engineers and Surveyors in the profession

Boards of Registration

Professional Engineers and Surveyors

Professional & Technical Societies

Engineers and Surveyors
"Professional engineer" means an individual who, by reason of that individual's special knowledge of the mathematical and physical sciences and the principles and methods of engineering analysis and design which are acquired by education and practical experience, is qualified to engage in the practice of engineering as attested by that individual's registration as a professional engineer.
"Land surveyor" means a person who: has special knowledge of mathematics and surveying principles and methods that are acquired by education and practical experience; and is a registered land surveyor.
Who can practice engineering or surveying?

- According to the law, only licensed professional engineers can practice engineering and licensed professional surveyors can practice surveying.
1. Graduation from program in engineering or surveying acceptable to the Board (typically, ABET EAC accredited)

2. Passing the Fundamentals of Engineering or Fundamentals of Surveying Exam

3. Four years of 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 or PS) Exam
Each state and territory has “registration laws”

Laws are implemented by Boards of Registration

Indiana has separate boards for Engineering and Surveying

http://www.in.gov/pla/engineer.htm
http://www.in.gov/pla/surveyor.htm
"Practice of engineering" means any service or creative work that the adequate performance of requires engineering education, training, and experience in the application of special knowledge of the mathematical, physical, and engineering sciences to services or creative work that includes the following:

1. Consultation.
2. Investigation.
3. Evaluation.
4. Planning, including planning the use of land and water.
5. The design of or the supervision of the design of engineering works and systems.
6. Engineering surveys and studies or the supervision of engineering surveys and studies, ...
7. Evaluation of construction for the purpose of assuring compliance with specifications, plans, and designs, in connection with any public or private utilities, structures, buildings, machines, equipment, processes, work systems, or projects.
Industrial Exemption
IC 25-31-1-20

Exempt persons
(a) An employee or a subordinate ..... 

(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

   (3) that is registered as a landscape architect under IC 25-4-2 and while the individual or business is engaged in the practice of landscape architecture planning the use of land or water.
NCEES (http://www.ncees.org) is a nonprofit organization dedicated to advancing professional licensure for engineers and surveyors.

It develops, administers, and scores the examinations used for all engineering and surveying licensure in the United States.

NCEES members are the engineering and surveying licensure boards from all 50 states, the District of Columbia, Guam, Puerto Rico, and the U.S. Virgin Islands.
Licensure Requirements

- Licensure requires:
  - Special knowledge of:
    - the mathematical and physical sciences,
    - the principles and methods of engineering analysis and design,
  - Knowledge of and compliance with the relevant laws, regulations, standards, and codes
  - Commitment to the public health, safety, and welfare
  - Ethical behavior

- Passing the FE or FS exam

- Practice experience in actual engineering or surveying work

- Passing the PE or PS exam tests on engineering or surveying problem solving, design, knowledge of laws, regulations, standards, codes, and ethical behavior
In most states, engineers and surveyors must:

- Renew their licenses every two years
- Complete continuing education work for license renewal
  - Typically 30 Professional Development Hours (PDHs) every two years.
  - Could use regular college courses
  - Participation in conferences
  - Participation in technical societies
  - Other activities approved by the Board
The FE and FS are designed for recent graduates and students who are close to finishing an undergraduate engineering or surveying degree.

After passing the FE or FS exam, a person must apply to the appropriate State Board to become:
- An Engineering Intern
- A Surveying Intern

The FE and FS exams are valid in all states and territories and do not expire.
FE Exam Details

- To register for the FE exam, create and log in to your MyNCEES account (https://account.ncees.org/login)

- Select the REGISTER button, and follow the onscreen instructions.

- Learn more about the exam and the exam environment by reading the rules and policies at: http://ncees.org/exams/cbt/examinee-guide/
Once you sign in to your MyNCEES account:

- Register and pay for the exam ($225, credit card only)
- Receive authorization notification from NCEES to schedule an exam.
- The FE and FS exams are available year round.
- Schedule the exam (through MyNCEES account).
- Receive the appointment confirmation letter from Pearson VUE.
Registration for FE and FS exams (good for 1 year)

Indiana Engineering and Surveying Boards do not require permission to register

Schedule to take the exam at NCEES.
- Can be taken at any Pearson Vue Testing Center
- Seats may be limited
- Purdue has an approved center in Schleman Hall, Room B42.
A video series that introduces examinees to the exam-day experience for the computer-based Fundamentals of Engineering and Fundamentals of Surveying exams.

- 7 videos
- 7 minutes, 52 seconds

http://www.youtube.com/playlist?list=PLiZ0hjHNi9jzR8RW69ndkjlGigH8bzj0ew-
CBTuesdays Videos

- Pearson VUE exam-day experience
- How to search the onscreen NCEES reference handbook
- Pearson VUE reusable booklet
- How to flag items for review
- Onscreen calculator for computer-based exams
- Computer-based testing hotkeys
- Managing your time on exam day
Information about Purdue Site

- Site has 15 test consoles
- Site also does other tests, e.g. GMAT, CLEP
- Hours
  - Mon 8:00 am – 5:00 pm
  - Wed and Thurs noon to 9:00 pm
  - Open 2\textsuperscript{nd} and 4\textsuperscript{th} Saturdays 8:00 am – 5:00 pm
  - Additional days and times may be forthcoming
Purdue Pearson Vue Site

Schleman Hall, Room B42
Purdue Pearson Vue Site

Receptionist – Caylen Redden
Purdue Pearson Vue Site

Testing Center Manager – Cindy Fields
Local Rules for the Test Room

- No hoodie sweatshirts for either men or women
- Sweaters or jackets must not have pockets
Indiana Sites

1. Pearson Professional Centers-Indianapolis IN
   The Pyramids at College Park
2. Pearson Professional Centers-Indianapolis (West)
   (West/Speedway side of Indianapolis)
3. Purdue U-Office of the Dean of Students Test Ctr.,
   Schleman Hall, Room B42
4. Pearson Professional Centers-Fort Wayne IN
5. Pearson Professional Centers-Terre Haute IN
6. Ivy Tech Community College
   250 E. Sample Street
   Corporate College, A28
   South Bend, Indiana 46601
7. Pearson Professional Centers-Merrillville IN
   8585 Broadway, Suite 745
   Merrillville, Indiana 46410

For all locations:  http://ncees.org/exams/cbt/testing-center-locations/
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.

Download FE Supplied-Reference Handbook

Enter your e-mail address to receive a password:

Submit E-mail

Enter a valid password to download the FE Supplied-Reference Handbook:

Submit Password
The FE is offered in seven disciplines. Specifications for the exams are as follows:

- FE Chemical
- FE Civil
- FE Electrical and Computer
- FE Environmental
- FE Industrial
- FE Mechanical
- FE Other Disciplines
- FS Exam
## Licensing Exams Standouts

<table>
<thead>
<tr>
<th>Licensing Exam</th>
<th>National Pass Rate</th>
<th>Purdue Pass Rate</th>
<th>Change in Purdue pass rate from FY13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Gerontology Nurse Practitioner</td>
<td>85.7%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Registered Nurse</td>
<td>83.0%</td>
<td>91.1%</td>
<td>0%</td>
</tr>
<tr>
<td>Doctor of Audiology</td>
<td>63.3%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Fundamentals of Engineering</td>
<td>77.1%</td>
<td>93.3%</td>
<td>-2.7%</td>
</tr>
</tbody>
</table>

*New electronic format*
## Purdue FE Exam Pass Rates

<table>
<thead>
<tr>
<th></th>
<th>Purdue No. Passed</th>
<th>Purdue % Passed</th>
<th>National Pass Rate</th>
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</thead>
<tbody>
<tr>
<td>2008-2009</td>
<td>341</td>
<td>92.4%</td>
<td>77.4%</td>
</tr>
<tr>
<td>2009-2010</td>
<td>462</td>
<td>91.7%</td>
<td>76.8%</td>
</tr>
<tr>
<td>2010-2011</td>
<td>469</td>
<td>94.0%</td>
<td>78.0%</td>
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<tr>
<td>2011-2012</td>
<td>478</td>
<td>89.4%</td>
<td>75.4%</td>
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<tr>
<td>2012-2013</td>
<td>455</td>
<td>96.0%</td>
<td>72.3%</td>
</tr>
<tr>
<td>2013-2014</td>
<td>392</td>
<td>93.3%</td>
<td>77.1%²</td>
</tr>
</tbody>
</table>
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
Established by membership of professional societies

Standard Format (especially among engineering organizations)
- Preamble
- Fundamental Canons
- Rules of Practice
- Professional Obligations
Professional engineers take seriously their responsibility – not just for the quality of the jobs they work on – but for the safety and well-being of the public at large. Since its founding, NSPE has been the profession's most respected voice on the practice of ethical engineering.

What's New
2009 Milton F. Lunch Ethics Contest. Read about the contest >>

Code of Ethics
Read the guiding principles of the NSPE Code of Ethics and the Engineers' Creed. >>

Board of Ethical Review
Founded in 1954, NSPE's BER serves as the profession's guide through ethical dilemmas and interpreter of the Code of Ethics. >>

Ethics Resources
Although engineers often make decisions using precise scientific principles, answers to ethical questions are often varying shades of gray. Here are resources to help. >>
I. Fundamental Canons

Engineers, in the fulfillment of their professional duties, shall:

1. Hold paramount the safety, health and welfare of the public.
2. Perform services only in areas of their competence.
3. Issue public statements only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.
II. Rules of Practice

Canon 1. Engineers shall hold paramount the safety, health, and welfare of the public.

a. If engineers' judgment is overruled under circumstances that endanger life or property, they shall notify their employer or client and such other authority as may be appropriate.

b. Engineers shall approve only those engineering documents that are in conformity with applicable standards.

c. Engineers shall not reveal facts, data or information without the prior consent of the client or employer except as authorized or required by law or this Code.

Three more rules …
2. Perform services only in areas of their competence. (Three Rules of Practice)

3. Issue public statements only in an objective and truthful manner. (Three Rules of Practice)

4. Act for each employer or client as faithful agents or trustees. (Five Rules of Practice)

5. Avoid deceptive acts. (Two Rules of Practice)
III. Professional Obligations

1. Engineers shall be guided in all their relations by the highest standards of honesty and integrity.

   a. Engineers shall acknowledge their errors and shall not distort or alter the facts.

   b. Engineers shall advise their clients or employers when they believe a project will not be successful.

   c. Engineers shall not accept outside employment to the detriment of their regular work or interest. Before accepting any outside engineering employment they will notify their employers. Engineers shall not attempt to attract an engineer from another employer by false or misleading pretenses.

   d. Engineers shall not promote their own interest at the expense of the dignity and integrity of the profession.

Continued ….(Nine Professional Obligations altogether)
Three Major Sections:

1) *Licensee’s Obligation to Society*

2) *Licensee’s Obligations to Employers and Clients*

3) *Licensee’s Obligations to Other Licensees*
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
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
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.
Code of Ethics Examination (Good practice for FE Exam)

Take NSPE's true/false exam to test your knowledge of professional engineering ethics. (25 questions)

When you're done, click on the "Answers" link at the bottom of the page to see how well you did

- Each answer gives reference to the specific NSPE Code provision covering this question.

http://www.nspe.org/Ethics/EthicsResources/EthicsExam/index.html
Sample Questions from NSPE Code of Ethics Exam

- Engineers, in the fulfillment of their professional duties, must carefully consider the safety, health, and welfare of the public.

- Answer is?

- False –

- See NCEES Model Code of Ethics A.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.
Engineers may perform services outside of their areas of competence as long as they inform their employers or clients.

The answer is: ?

False –

See NCEES Model Code of Ethics B.1. Licensees shall undertake assignments only when qualified by education or experience in the specific technical fields of engineering or surveying involved.
Engineers may issue subjective and partial statements if such statements are in writing and consistent with the best interests of their employers, clients, or the public.

The answer is: False

See NCEES Model Code of Ethics A.4. Licensees shall be objective and truthful in professional reports, statements, or testimony. They shall include all relevant and pertinent information in such reports, statements, or testimony.
FE Exam Strategies – Before the Exam

- Download or use hard copy of FE Supplied Reference Manual
  - Become familiar with topics listed
  - Practice using it

- Obtain an approved calculator
  - **Casio:*** All fx-115 models. Any Casio calculator must contain fx-115 in its model name.
  - **Hewlett Packard:*** The HP 33s and HP 35s models, but no others.
  - **Texas Instruments:*** All TI-30X and TI-36X models

- Become familiar with the approved calculator that you will use.
FE Exam Strategies – Before the Exam

- Review the material to be covered by the exam from the NCEES website.
  - FE Exam: http://ncees.org/exams/fe-exam/
  - FS Exam: http://ncees.org/exams/fs-exam/

- NCEES web site gives specific topics it each discipline, e.g. for civil engineering
FE Exam Strategies – Before the Exam

- Study the NCEES Exam Day Policies
  [http://ncees.org/exams/exam-day-policies/](http://ncees.org/exams/exam-day-policies/)

- Find out the building and room number of the exam.

- Decide on where you will park.

- Decide on where you will get lunch or a snack for the 25 minute break

- Get a good nights sleep before the exam

- Review the NCEES Candidate Agreement
FE Exam Strategies – Morning of the Exam

- Take with you to the exam:
  - Exam Authorization notice issued by NCEES
  - A current, government-issued identification, giving: name, date of birth, expiration date, signature, and a recent and recognizable photograph. The first and last name on the examinee’s ID and Exam Authorization must match. **Student and expired IDs will not be accepted.**
  - An approved calculator
  - Any personal items such as medications, lunch, etc. in a clear plastic bag

- You **will not be allowed** to have on your person when entering the test room:
  - Cell phone
  - Pencils, pens, or scratch paper
  - Any other devices or reference materials (The FE and FS Reference manual will be available online (split screen).)
FE Exam Strategies – Day of the Exam

- Arrive at the test room at least 30 minutes prior to the start of the exam.
- Bring with you your appointment confirmation letter.
- You will be assigned a seat showing your information.
- Cameras monitor each individual during the test.
- Restroom breaks are monitored and the test clock continues while out except for the 25 minute break.
Once you begin the test:

- Look through the test to get a feel for the categories and questions.
- Begin answering questions that you feel most confident in answering.
- Read each question several times to make sure you understand it.
- If you need to write down equations or notes, they must be done on a special pad provided to you.
- Before selecting an answer, be sure that it is reasonable, has the correct units (if appropriate).
- Time yourself. If you can’t answer a question in about 3 minutes, flag it and move on. In each session, you can go back to flagged questions.
- If you are unsure of an answer, eliminate the most unreasonable answers and guess on the remaining ones.
- Answer all questions – there is no penalty for wrong answers.
- If you finish before the break time, go back to check your work, especially on questions that were guesses.
Resume Maintenance

- At the time that a person applies to take the Principles and Practice (PE) exam, details of all of the work experience since passing the FE exam will be required.

- The easiest way to document work experience is to update your resume as new experiences are completed and at least annually.
Professional Licensure is required for the practice of engineering and surveying in all states.

FE and FS Exams
- The exams are computer based.
- There are separate exams for each of seven disciplines and one for other disciplines.

Ethics involves:
- Licensee’s Obligation to Society
- Licensee’s Obligations to Employers and Clients
- Licensee’s Obligations to Other Licensees

Be well rested, study rules, come early, bring Exam Authorization notice, and a current government-issued photo ID.
Summary, Cont’d.

FE Exam Strategies

- Listen to the instructions
- Begin answering questions that you feel most confident in answering.
- Read each question several times to make sure you understand it.
- Any and all writing must be done on the scratch pad provided.
- Before selecting an answer, be sure that it is reasonable, has the correct units (if appropriate)
- Time yourself with about 3 min./question. If you are unsure of an answer, eliminate the most unreasonable answers and guess on the remaining ones.
- Answer all questions – there is no penalty for wrong answers.
Plan to take the FE or FS exams in the last semester before graduation.

Encourage your engineering classmates to do the same.

Continue the tradition of high pass rates for Purdue Engineers!
Questions?

For future questions
drnevich@purdue.edu
Good Luck!!!

Vince Drnevich

E-mail: drnevich@purdue.edu