According to the U.S. National Council of Examiners for Engineering and Surveying (NCEES) there is a general four-step process for licensure candidate:

1. Earn a degree from an ABET-accredited engineering program.
2. Pass the FE exam
3. A minimum of four years work experience. In most cases, this must be completed under the supervision of a P.E.
4. Pass the professional engineering (PE) exam in the appropriate discipline
• The exam is intended for students who are near to completing an undergraduate engineering degree.

• FE exam is offered in seven different areas which are:
  1. Chemical
  2. Civil
  3. Electrical
  4. Environmental
  5. Industrial
  6. Mechanical
  7. Other Disciplines
• The PE examinations are intended to test the applicant’s ability to apply engineering knowledge and experience, and the ability to assume responsible charge in the practice of engineering.

• Brick [1985] urges every junior engineer to bear in mind the EIT (FE) requirements; he further notes that the industry has few formal training programs designed specifically to certify engineers.
• The engineering profession attempts to guarantee competence in engineering fundamentals through the EIT (FE) and PE examinations [Darr, 1981].

• Darr notes that no certification program can prevent unethical or unprofessional work; this can only be prevented by individual integrity.
• The engineering profession’s ethical standards should be part of the undergraduate engineering curriculum [Darr, 1981].

• Also, Darr recommends including questions on ethics in the EIT (FE) and PE examinations.

• Covert [1992] states that the most important goal of an engineering program should be to prepare four-year engineering graduates with the background to cope successfully with their first few entry-level assignments.
Covert [1992] notes that specifically, since the goal of an engineer is to define and to solve problems that will support the design and manufacture of products intended to improve people’s lives, an engineer-in-training must develop solid technical understanding, problem-solving abilities, communication skills, and exhibit highly ethical behavior.
Why FE Exam Certificate?

• The first of two examinations that engineers must pass in order to be licensed as a Professional Engineer (P.E) in the United States is the Fundamentals of Engineering exam (FE), which was formerly known as the Engineer-in-Training (EIT) exam.

• The FE exam is recognized as an important first step in an engineering career.
• In this study, a total number of 114 civil engineering (which also includes transportation, structural and construction engineering) plus 37 environmental engineering job positions have been surveyed from August through October 2013 on the Monster.com website.

• There were several parameters desirable for employment as a civil engineer in different type of companies, such as educational degree, work experience, computer skills, writing skills, etc.
IMPORTANCE OF HAVING AN FE CERTIFICATION FOR CIVIL ENGINEERS

• In civil engineering job positions, it was found that 51% of companies certainly required the FE exam certificate along with the other qualifications.

• Approximately 9% of them did not specifically ask for FE certification, but they preferred those applicants who have the FE certification.

• The remained (40% of employers) did not indicate any preference for FE certificate.

(chart 1)
FE Certification for Civil Engineering (General) Job Positions (Chart1)

- FE preferred positions: 40%
- FE Required positions: 9%
- FE NOT Required positions: 51%
Importance of Having an FE Certification for Environmental Engineers

• Typically environmental engineer employers care less than civil engineer companies about having a FE certificate by applicants.

• This survey indicated that 16% of job positions definitely required the FE exam certificate.

• Roughly 19% of them did not request a FE certificate but having the certification is desirable for them.

• The remained (65% of surveyed positions) did not indicate any preference for FE certificate. (chart 2)
FE Certification for Environmental Engineering Job Positions (chart 2)

- 65% FE NOT Required positions
- 16% FE Required positions
- 19% FE preferred positions

IMPORTANCE OF HAVING AN FE CERTIFICATION FOR ENVIRONMENTAL ENGINEERS (CONT’D)
UAB has five engineering departments:

- Biomedical Engineering
- Civil, Construction, and Environmental Engineering
- Electrical and Computer Engineering
- Materials Science and Engineering
- Mechanical Engineering
<table>
<thead>
<tr>
<th>Engineering Department</th>
<th>Auburn University</th>
<th>University of Alabama</th>
<th>University of Alabama at Birmingham</th>
<th>University of Alabama in Huntsville</th>
<th>University of South Alabama</th>
<th>Tuskegee University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerospace or Aerospace Science Engineering</td>
<td>0/20 = 0.000</td>
<td>0/17 = 0.000</td>
<td>0/11 = 0.000</td>
<td>0/7 = 0.000</td>
<td>0/8 = 0.000</td>
<td>3/8 = 0.375</td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td>—</td>
<td>—</td>
<td>0/11 = 0.000</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Biosystems Engineering</td>
<td>5/14 = 0.357</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<td>—</td>
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<tr>
<td>Chemical Engineering or Chemical &amp; Materials or Chemical &amp; Biological Engineering</td>
<td>17/29 = 0.586</td>
<td>5/30 = 0.167</td>
<td>8/10 = 0.800</td>
<td>2/10 = 0.200</td>
<td>4/9 = 0.444</td>
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</tr>
<tr>
<td>Civil, Construction, &amp; Environment Engineering or Civil &amp; Environmental Engineering or Civil Engineering</td>
<td>0/19 = 0.000</td>
<td>0/25 = 0.000</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<tr>
<td>Computer Science and Software Engineering</td>
<td>2/28 = 0.071</td>
<td>0/17 = 0.000</td>
<td>5/16 = 0.3125</td>
<td>1/22 = 0.045</td>
<td>1/11 = 0.091</td>
<td>0/15 = 0.000</td>
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<td>Electrical Engineering or Electrical &amp; Computer Science</td>
<td>2/15 = 0.133</td>
<td>—</td>
<td>—</td>
<td>0/7 = 0.000</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Engineering Department</td>
<td>Auburn University</td>
<td>University of Alabama</td>
<td>University of Alabama at Birmingham</td>
<td>University of Alabama in Huntsville</td>
<td>University of South Alabama</td>
<td>Tuskegee University</td>
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<tr>
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</tr>
<tr>
<td>Materials Science or Material Science and Engineering</td>
<td>1/11 = 0.091</td>
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<tr>
<td>Mechanical Engineering or Mechanical and Aerospace Engineering</td>
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<td>0/20 = 0.000</td>
<td>1/16 = 0.0625</td>
<td>0/25 = 0.000</td>
<td>2/9 = 0.222</td>
<td>2/10 = 0.200</td>
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<tr>
<td>Metallurgical and Materials Science</td>
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<tr>
<td>Polymer Engineering</td>
<td>1/8 = 0.125</td>
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</tbody>
</table>
Prior to fall 2008, no FE-training was provided to undergraduate civil engineering students.

The faculty in the Department of Civil, Construction, and Environmental Engineering were concerned about the low passing rates.

During fall 2008 and subsequent semesters thereafter, FE-training was provided as part of our senior design class, the capstone class in civil engineering, culminating 4-years of undergraduate education.
FE PASSING RATES IN CIVIL ENGINEERING RELATED ENGINEERING CURRICULA AT UAB

• Post-implementation of FE-training for civil engineering curricula increased FE-passing rates by 14%.

• Post-implementation of FE-training for civil engineering-related curricula (including environmental, structural, construction, geotechnical, transportation, and water resources) increased FE-passing rates by 9%.
### FE Pass Rates of April 2013 Candidates Nationwide

<table>
<thead>
<tr>
<th>Exam Module</th>
<th>1st–Time Takers</th>
<th>Repeat Takers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Engineering</td>
<td>86</td>
<td>47</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>81</td>
<td>47</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>70</td>
<td>27</td>
</tr>
<tr>
<td>Environmental Engineering</td>
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<td>42</td>
</tr>
<tr>
<td>Industrial Engineering</td>
<td>73</td>
<td>52</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>83</td>
<td>42</td>
</tr>
<tr>
<td>Other Disciplines</td>
<td>74</td>
<td>38</td>
</tr>
</tbody>
</table>
SUMMARY AND CONCLUSIONS

• Recent job announcements for civil engineering entry level positions indicate that ~60% of the job announcements prefer having applicants with FE certification.

• Recent job announcements for environmental engineering entry level positions indicate that ~35% of the job announcements prefer having applicants with FE certification.

• Implementation of FE-training as part of our civil engineering curricula has significantly improved the passing rate of civil engineering undergraduates who have taken the FE exam at UAB.
Special thanks are provided to the Department Chair (Dr. Fouad H. Fouad) in providing the data from the National Council of Engineering Examiners for Engineering and Surveying (NCEES) in compiling the passing rates for civil engineering undergraduate students pre- and post-implementation of a FE-training course as part of our civil engineering program.
Questions???