Fundamentals of Engineering exam

The **Fundamentals of Engineering (FE) exam**, also referred to as the **Engineer in Training (EIT) exam**, and formerly in some states as the **Engineering Intern (EI) exam**, is the first of two examinations that engineers must pass in order to be licensed as a Professional Engineer (PE) in the United States. The second examination is Principles and Practice of Engineering Examination. The FE exam is open to anyone with a degree in engineering or a related field, or currently enrolled in the last year of an Accreditation Board for Engineering and Technology (ABET) accredited engineering degree program. Some state licensure boards permit students to take it prior to their final year, and numerous states allow those who have never attended an approved program to take the exam if they have a state-determined number of years of work experience in engineering. Some states allow those with ABET-accredited "Engineering Technology" or "ETAC" degrees to take the examination. The state of Michigan has no admission pre-requisites for the FE.[1] The exam is administered by the National Council of Examiners for Engineering and Surveying (NCEES).

Principles and Practice of Engineering Examination

Acronym	FE
Type	Computer-based exam (since 2014)
Developer / administrator	National Council of Examiners for Engineering and Surveying
Knowledge / skills tested	Analytical reasoning, quantitative reasoning, discipline-specific subjects
Purpose	Professional licensure
Duration	6 hours
Score / grade range	Pass/Fail
Countries / regions	United States
Languages	English
Prerequisites / eligibility criteria	Varies per state
Fee	Varies per state
Scores / grades used by	Professional state licensing boards
Website	ncees.org/engineering/fe/ (https://ncees.org/engineering/fe/)

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Structure

As of 2014, the FE and FS exams are offered only via Computer Based Testing (CBT). The exam consists of 110 questions and is given during a 6-hour session, of which 5 hours and 20 minutes is designated as time for answering the questions. The remaining time includes a tutorial, presented at the beginning of the session, and an optional 25-minute break. Examinees must apply to be tested in one of seven fields: chemical, civil, electrical and computer, environmental, industrial and systems, mechanical, and other disciplines.

Prior to 2014, the exam was divided into two 4-hour sessions with a lunch break in between. The morning session consisted of 120 questions in a range of scientific/engineering subjects and had to be taken by all examinees, while the afternoon session consisted of 60 questions and could be taken either in a specific discipline or as a general engineering test. In 2015, content changes in the exam were instituted to make it entirely discipline-specific, with a plan of weaving general engineering subject matter (e.g. math and science fundamentals) throughout the exam.[2] Less of the "full breadth" of most traditional engineering undergraduate curricula will be captured with this approach - such as the broad math and science foundation spanning chemistry, physics, mechanics (i.e. statics and dynamics), materials science, computer science, electronics/circuits, engineering design, and the standard range of engineering mathematics (i.e. calculus, differential equations, statistics). A concern was that, while most undergraduate engineering students are in fact exposed to most of these subjects, they may not necessarily take courses in specialized topics such as thermodynamics and fluid mechanics.

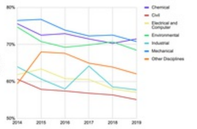
Since July 2020, the NCEES has made updates across all FE exam disciplines.[3] For example, the topic "Computational Tools" was removed for the civil and mechanical disciplines. In other cases, topics and subtopics have been merged or combined. The NCEES also published an updated version of the tenth edition of the FE Reference Handbook. The handbook was revised incorporating a coherent single-page layout instead of a two-column layout, the addition and removal of a few new equations, and updated FE Exam Specifications.

Those who pass the exam are sometimes designated Engineer In Training or Engineer Intern depending on their state's licensure board's approach to recognizing those who are partway through the licensure process. Many engineering firms will judge an engineering job applicant based on whether they have passed the FE exam and registration as an EIT. Passing the FE Exam shows that an applicant has not forgotten the basic fundamental engineering principles they learned as an undergraduate student.[4] After obtaining a given amount of work experience (the length of which is set by state law and may be based on the type of degree received), an EIT/EI may qualify to take the Professional Engineer (PE) exam. Actual licensure can then be applied for and awarded upon successful completion of the PE exam. The standard time of work experience (which may need to be under a Professional Engineer) is four years in most US states, for graduates of an ABET-accredited engineering program.

Passing rates

The NCEES posts passing rates bi-annually on their website, but these passing rates are restricted to a few criteria:[5]

- Took the FE exam for the first time
- Attended EAC/ABET-accredited engineering programs
- Took the FE exam within 12 months of graduation



FE exam pass rates over time

This subset of passing rates tends to be between 70 to 80% for each discipline. They also post complete passing rates annually in their Squared Report which includes all examinees.[6] These reports have been available since 2014 and show an interesting general trend of gradually decreasing over time.[7]

Passing scores

NCEES does not officially state how many questions must be right to pass. Instead, NCEES claims that a passing score is based on psychometric statistical methods without revealing what the actual passing score is.

To protect the integrity of the exam, examinees are taking unique exams, generated from a large, volunteer-sourced NCEES problem bank. This is why the NCEES provides a scaled score report (https://ncees.org/wp-content/uploads/CBT-Diagnostic-for-the-web-site_October-2018.pdf), so while exam difficulty is generally about the same for everyone, they do vary some, and the scaling is necessary for comparison purposes. Passing scores are established by the NCEES and are not curved relative to other examinees' performances. This is made clear when you see that each exam's pass rates are different from others and vary year to year in the plot above.

U.S. Patent Office

Passage of the Fundamentals of Engineering Exam, along with graduation with any Bachelor's degree or equivalent, satisfies the United States Patent and Trademark Office (USPTO)'s technical requirements for sitting for its registration examination to become either a registered patent attorney or patent agent.[8]

See also

- National Council of Examiners for Engineering and Surveying (NCEES)
- Principles and Practice of Engineering Examination (PE exam)
- Graduate Aptitude Test in Engineering (GATE)
- Graduate Record Examination (GRE)

References

1. "Professional Engineers Examination" (http://www.michigan.gov/lara/0,4601,7-154-35299_61343_35414_60647_35472-114639--,00.html).
2. "The Evolution of the FE - National Society of Professional Engineers" (http://www.nspe.org/resources/pe-magazine/march-2015/evolution-fe). *National Society of Professional Engineers*.
3. "NCEES FE exam information" (https://ncees.org/engineering/fe/). *National Council of Examiners for Engineering and Surveying*.
4. "Are your undergraduate studies preparing you for the FE exam?" (https://www.directhub.net/are-your-undergraduate-studies-preparing-you-for-the-fe-exam/). *DirectHub*.
5. "NCEES FE exam information" (https://ncees.org/engineering/fe/). *NCEES*. Retrieved September 29, 2020.
6. "NCEES archived annual reports and Squared" (https://ncees.org/about/publications/past-annual-reports-squared/). *NCEES*. Retrieved September 29, 2020.
7. "Is the FE Exam hard?" (https://www.prepfe.com/blog/2020/9/is-the-fe-exam-hard). *PrepFE*. Retrieved September 29, 2020.
8. "General Requirements Bulletin for Admission to the Examination for Registration to Practice in Patent Cases Before the United States Patent and Trademark Office" (https://web.archive.org/web/20130426051321/http://www.uspto.gov/ip/boards/oed/GRB_March_2012.pdf) (PDF). *United States Patent and Trademark Office*. p. 8. Archived from the original (http://www.uspto.gov/ip/boards/oed/GRB_March_2012.pdf) (pdf) on April 26, 2013. Retrieved December 7, 2021.

External links

- Official NCEES website (http://www.ncees.org)
- NCEES website on Fundamentals of Engineering Examination (https://ncees.org/engineering/fe/)
- NCEES Calculator Policy (http://ncees.org/exams/calculator/)
- State Licensing Boards (http://www.ncees.org/Licensing_boards.php)
- PrepFE website and iOS apps offer FE exam preparation (https://www.prepfe.com)
- School of PE Website offers FE Exam review courses (https://www.schoolofpe.com/fe/)