


University of the Pacific  
Civil Engineering  
Department




*California's First  
Institution of  
Higher Learning*

*The Fundamentals of  
Engineering Exam*


Hector Estrada, P.E., Ph.D.  
Professor and Chair  
of Civil Engineering

Page 1



## Outline

- the Fundamentals of Engineering Exam in Context
  - Engineering registration requirements
- Overview of Exam
- Registering for the Exam
- Preparing for the Exam
- Exam day
- References



Page 2

## Fundamentals of Engineering exam in context



## Engineering

- Engineering is a profession like medicine, law, etc. which aspires to high standards of conduct and recognizes its responsibility to the general public.
- Engineers apply knowledge of math and the physical sciences to the efficient design and construction of usable devices, structures and processes.
- Design is based on guidelines or codes, which are intended to protect the public
  - These codes are established by organizations, governments, municipalities, and so on to control the construction or manufacturing of various systems.
  - Also, The design professional is required to acquire a level of competence through **Education, Examinations and Experience** before s/he is allowed to practice as a professional
- This is controlled though professional registration or licensing





## Licensing Process

- First, one must attend an EAC/ABET accredited program and successfully complete the degree requirements;
- Second, one must take and pass the **Fundamentals of Engineering exam (take this seriously)**;
- then, one must practice under the supervision of a registered designer for several years before the final step in the process of registration,
- Finally, one must qualify for, take, and pass the Principles-and-Practices of Engineering (PE) exam.
- Only then can an engineer independently practice engineering design legally. A person that has posed as a registered engineer and designed a structure that collapses may experience the same fate today as in ancient Babylonia.



Page 5

## Overview of FE



Page 6



## Format

- Morning (AM) Part
  - 120 questions in 4 hours, 2 minutes per question
  - General subjects covered in the lower division courses
- Afternoon (PM) part
  - 60 questions in 4 hours, 4 minutes per question
  - Choice of a number of disciplines - concepts covered in the upper division courses
  - General exam similar to the one in the morning



Page 7

## AM part general subjects

	# of questions
Mathematics	19
Engineering Probability and Statistics	8
Chemistry	11
Computers	8
Ethics and Business Practices	8
Engineering Economics	10
Engineering Mechanics (Statics and Dynamics)	13
Strength of Materials	8
Materials Properties	8
Fluid Mechanics	8
Electricity and Magnetism	11
Thermodynamics	8



Page 8

## PM part general

	# of questions
Advanced Engineering Mathematics	6
Engineering Probability and Statistics	5
Biology	3
Engineering Economics	6
Application of Engineering Mechanics	8
Engineering of Materials	7
Fluids	9
Electricity and Magnetism	7
Thermodynamics and Heat Transfer	9



## PM part CE discipline specific

Surveying	7
Hydraulics and Hydrologic Systems	7
Soil Mechanics and Foundations	9
Environmental Engineering	7
Transportation	7
Structural Analysis	6
Structural Design	6
Construction Management	6
Materials	5



## PM part EE discipline specific

Circuits	10
Power	8
Electromagnetics	4
Control Systems	6
Communications	5
Signal Processing	5
Electronics	9
Digital Systems	7
Computer Systems	6



## Scoring

- Morning part – 1 point each question
- Afternoon part – 2 points each question
- Raw score is 240 points
- Raw passing score (total out of 240 pts) normalized to 70%
- From exam history, raw passing score has been roughly 55-60%, but may be higher





## Registering for the Exam



Page 13



## State information

- Visit the California Board for Professional Engineers and Land Surveyors website for more information at:  
<http://www.pels.ca.gov/>
- Application information can be found at:  
[http://www.pels.ca.gov/applicants/eit\\_Isita\\_pp.shtml](http://www.pels.ca.gov/applicants/eit_Isita_pp.shtml)
- The applications can be downloaded from:  
[http://www.pels.ca.gov/pubs/forms/10\\_08\\_eit\\_Isit\\_app.pdf](http://www.pels.ca.gov/pubs/forms/10_08_eit_Isit_app.pdf)



Page 14



## Exam Qualifications

- Applicants must have completed:
  - **Three years of course work** in a Board-approved engineering curriculum (any curriculum approved by the Engineering Accreditation Commission [EAC] of the Accreditation Board for Engineering and Technology [ABET]).
  - **OR** three years or more of engineering-related work experience anywhere in the world.
  - **AND** never have been convicted of a crime substantially related to the practice of engineering.



## Preparing for the FE exam





## Calculators

- The following models are the only calculators that will be permitted in the examination room:
- **Hewlett Packard**
  - HP-33s
  - HP-35s
- **Casio**
  - All FX-115 models. Must have FX-115 in it's model name.
- **Texas Instruments**
  - All TI-30X and TI-36X models. Any Texas Instruments calculator must contain either TI-30X or TI-36X in its model name.
- **Start using one of these calculators now**



Page 17



## In the PM, Discipline Specific vs General

- Choose the one you are most comfortable and best prepared to take – either your discipline specific exam or the general exam
- **General PM part**
  - More complex questions than in the morning.
    - One difference between the AM and PM problems is that the PM problems usually have a lot of extra information provided, which is NOT needed to solve the problem.
  - Advantage of General PM part is that you will have reviewed the general subject for the AM part.
- **Discipline Specific Part**
  - If you have taken most of your upper division courses, this may be more appropriate, and in many cases the questions are easier to solve than the General PM exam.



Page 18




## Mind – Studying

---

- Review (TAKE THIS SERIOUS)
  - Study material and sample exam questions and answers
  - Attend the review sessions
- Reference Handbook
  - Know it well
  - Be familiar with the sections you know best, statics, math, etc.
  - Be familiar with the Table of Contents
  - USE THE INDEX



Page 19



## Body

---

- Train to gain stamina
  - Test will begin at 8:00am
  - Will last all day
  - Practice exam questions under exam conditions (get up early some days and solve problems)
- Just before the test
  - No exotic meals (or drinks) the night before
  - Hearty breakfast
  - EAT LUNCH THE DAY OF THE EXAM. Bring lunch from home, with a beverage! Don't rely on scrounging for food at the test site – you and 1000 others.
  - Bring snacks (quite ones)
  - Layered clothing (it may be hot or cold in the room)



Page 20



## Summary of Preparation

- Use the review book, attend review sessions
- Study at different times of the day
- Focus on stuff you know
- Take sample tests
- Practice test environment (time of day and duration)
- Use the reference manual
- Organize everything in advance do not wait until the night before
  - If possible, stay near the testing center the night before the exam; make reservations ahead of time.
  - Drive to the test site at least one week beforehand so you know where it is, where the parking lot is located, entrances, etc. It may be dark when you get there on test day.
  - Assemble your 'things to take' list. Include on it:
    - Exam acceptance letter
    - Government issued picture ID (not UOP student ID card)
    - 2 calculators
    - Working watch for time keeping
    - Packed lunch & drink (don't count on having enough time to go someplace & get back in time)
    - Advil, allergy medicine, tissues
    - Quiet candy (lifesavers, chewing gum are ok) - ask monitors if you can have them
    - Seat cushion
- The night before:
  - Relax
  - No special food or drink
  - Most importantly, get a good night sleep

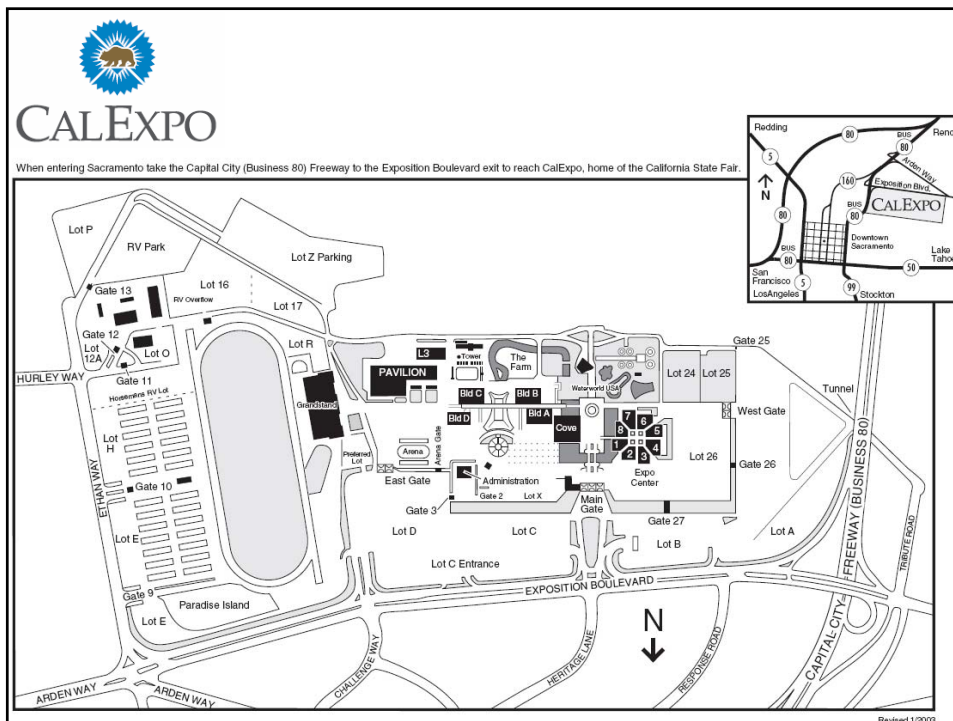


## Exam Day



# The Exam

- 8 hours!!!!!!!
- Know test venue (see next slide)
  - Building location
  - Parking
  - Room layout
  - Go by ahead of time, if not familiar with venue
- Proper supplies
  - Calculator – use one you know well (bring two)
  - Pencils and erasers are not allowed, but bring your own in case the proctors run out!
  - Watch
- Temperature
  - Layered clothing





## Morning part

- Doors open at 7:00 am (arrive early)
- Bring your acceptance letter plus a gov't issued picture ID (driver's license) to the exam, otherwise you won't get in
- Test begins as soon as everyone is seated
- No one is allowed to come in after test begins
- 10-15 minutes of instruction required
- Then fill in the answer sheet info
- 120 multiple choice questions (for the most part unrelated)
- Mark your answer in the scantron



receive full credit. There is no penalty for guessing. Answers marked in the test booklet will not be counted or graded and additional time will not be allowed in order to transfer answers to the machine scoreable answer sheet (scantron). IT IS THE RESPONSIBILITY OF THE EXAMINEE TO ENSURE THAT ALL TEST MATERIALS ARE RETURNED TO THE PROCTOR. FAILURE TO DO SO WILL RESULT IN YOUR EXAM NOT BEING SCORED AND FURTHER ACTION MAY BE TAKEN AGAINST YOU.

5



## Lunch

- Food to give you a boost
- Snacks for AM and PM parts
  - silent



Page 26



## Afternoon part

- 60 multiple-choice questions
- More detailed questions
- Grouped by subject areas
- Many questions are related to a common problem statement



Page 27



## Tips to Remember

- Read the question twice, solve the problem once.
- If you get stuck on one of the AM problems, you're probably reading too much into it, or you do not know it. MOVE ON.
- Keep in mind that many problems can be solved by either analyzing the answers or reverse engineering the problem. Read the problems carefully
- Don't get stuck working through the exam in the order that the questions are presented
  - Work all the problems in your primary area of expertise first
  - Then go to the area you know next best, and so on
  - Finally, don't waste time trying to work problems
- Remember, you only need answer about 60% of the questions correctly to pass. Concentrate on the problems you know something about
- You are not given scratch paper; you are expected to use the margins of the exam for calculations.
- Remember: Examiners and monitors have little sense of humor at that time, and zero patience for rule benders - don't press your luck.



Page 28



## Guessing

- Guess – no penalty for incorrect answers
- Problems that you do not know in detail
  - Work from the answer backwards
  - Use the reference manual
  - Eliminate some answers using common sense
- 15 minutes before the end of the session
  - Guess at all the remaining unsolved problems
  - Make a consistent choice as follows
    - When guessing, remember that the correct answers are randomly selected and therefore balanced, approximately equal number of As, Bs, Cs, and Ds as correct answers. 15 minutes before the end, count the number of As, Bs, Cs, and Ds you have selected, the letter with the corresponding smaller number will be the letter you should choose for the questions you have blank.



Page 29



## Summary of Test Day

- Come early
- Go to the bathroom right before the exam
- Room will be hot cold (layered clothing)
- Chairs will be hard, bring cushion for your seat
- Room may be noisy, bring earplugs to help you concentrate
- Administrative paperwork at the beginning of each session
- Work easy problems first
- Make educated guess
- Count number of each letter you have selected prior to guessing, then choose the remaining answers based on the letter you have the smallest number.



Page 30



## References

- FE information on the web:
  - [www.ncees.org](http://www.ncees.org)
    - Information about passing rates, calculator policy exam dates, learn more about professionalism, brief practice exam
  - [www.ppi2pass.com](http://www.ppi2pass.com)
    - FE review manual, take practice examination learn about examination
  - [www.eitexam.com](http://www.eitexam.com)
    - take practice exams for \$10.
- FE Review Manual by Lindeburg
  - New cost about \$75; We will loan you these
- FE Supplied-Reference Handbook
  - We will loan you these
- DS and General Sample Questions & Solutions – NCEES or PPI (Recommended)



Good Luck!!!!

