Fundamental of Engineering Examination
Review Sessions

January 24, 2018
6:00 PM
1236 Patrick F. Taylor Hall
Coordinator of the Review Sessions

- Dr. Louay Mohammad
- Civil and Environmental Engineering
- E-mail: Louaym@Lsu.Edu
Fundamental of Engineering Examination -- Outline

- Computer Based Testing
Why take the FE Exam?

- **Employment**
  - State agencies require FE certification

- **Pursue PE license**
  - Regulations established by state licensing boards
  - General requirements
    - Graduate from an ABET-accredited engineering program
    - **Pass FE exam**
    - Obtain 4 or more years of engineering experience (some credit given for advanced engineering degree)

- **Professional Career Advancement**
Why take the FE Exam?

- LAPELS recently changed rule § 1509 allowing Engineer Interns to take the PE exam any time subsequent to becoming certified as an EI with LAPELS.
- The rule became effective July 20, 2014
- Note, there is a risk associated with “early taking” which will be clearly shown on the applications as some states have said that they will not accept a PE exam taken before 4 years of experience are gained. So if anyone thinks they may move to another state in the future, they should research that state board’s position on this issue.
- At the time of application to LAPELS for professional licensure, the “early taker” applicant will be required to have passed both the FE and PE exams and have gained 4 years of progressive engineering experience. Individuals that wish to wait until they have 4 years of progressive engineering experience can apply at that time. Those applicants will be licensed immediately upon passing the PE exam.
Review Session Overview

- Review of subjects covered on national FE Exam
- January 24 – April 11, 2018
  - Wednesday
  - 6:00pm to 8:00pm
  - Review schedule
  - [http://www.eng.lsu.edu/students/current/resources/fe](http://www.eng.lsu.edu/students/current/resources/fe)
  - Example problems
<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC COVERED</th>
<th>INSTRUCTOR</th>
<th>CONTACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 24</td>
<td>Introduction</td>
<td>Mohammad</td>
<td><a href="mailto:louaym@lsu.edu">louaym@lsu.edu</a></td>
</tr>
<tr>
<td>January 31</td>
<td>Statics</td>
<td>Moorthy</td>
<td><a href="mailto:moorthy@lsu.edu">moorthy@lsu.edu</a></td>
</tr>
<tr>
<td>February 7</td>
<td>Electrical Engineering</td>
<td>Scalzo</td>
<td><a href="mailto:jscalz1@lsu.edu">jscalz1@lsu.edu</a></td>
</tr>
<tr>
<td>February 21</td>
<td>Strength of Materials</td>
<td>Moorthy</td>
<td><a href="mailto:moorthy@lsu.edu">moorthy@lsu.edu</a></td>
</tr>
<tr>
<td>February 28</td>
<td>Dynamics</td>
<td>Ramachandran</td>
<td><a href="mailto:pram@lsu.edu">pram@lsu.edu</a></td>
</tr>
<tr>
<td>March 14</td>
<td>Thermodynamics</td>
<td>Maris</td>
<td><a href="mailto:nmaris@lsu.edu">nmaris@lsu.edu</a></td>
</tr>
<tr>
<td>March 21</td>
<td>Math</td>
<td>Hongchao Zhang</td>
<td><a href="mailto:hozhang@math.lsu.edu">hozhang@math.lsu.edu</a></td>
</tr>
<tr>
<td>April 4</td>
<td>Fluid Mechanics</td>
<td>Tsai</td>
<td><a href="mailto:ftsai@lsu.edu">ftsai@lsu.edu</a></td>
</tr>
<tr>
<td>April 11</td>
<td>Engineering Economy</td>
<td>Sarker</td>
<td><a href="mailto:bsarker@lsu.edu">bsarker@lsu.edu</a></td>
</tr>
</tbody>
</table>

*All sessions are from 6:00 PM to 8:00 PM*
Exam Administration

- NCEES computer-based exams are administered exclusively at approved Pearson VUE test centers
- NCEES Examinee Guide – 38 Pages

- Website:
  - [www.ncees.org](http://www.ncees.org)
Reference Materials

- **NCEES FE Supplied Reference Handbook**
  - free download
  - Register or log in to MyNCEES to download your free copy of the FE Reference Handbook
  - https://account.ncees.org/login

- **Familiarize yourself with the e-version of hand book prior to the test**
  - http://ncees.org/engineering/fe/

- **NCEES YouTube channel**
  - Explore the computer-based exam experience
  - https://www.youtube.com/playlist?list=PLiZ0hjHNj9jzR8RW69ndkJlgH8bzj0ew-
    - 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 (TI-30XS)
    - Computer-based testing hotkeys
    - Managing your time on exam day
Eligibility

- No longer apply to LAPELS for approval.
- Register for the exam directly with NCEES
  - [https://account.ncees.org/login](https://account.ncees.org/login)
  - Current Exam fee: $225 Paid directly to NCEES
    » Check website for cancelation/re-fund policy
  - Future Exam Fee: Effective January 2018 will be reduced by $50 to $175
FE CBT Exam Specifications

- Greater scheduling flexibility for candidates, year-round.
  - Exams will be administered 175 days a year
  - Monday through Friday

- Test can be taken up to 3 times in a twelve month period and, but **only once** per testing window

- Effective January 1, 2016
  - Year-Round Testing (January – December)
  - Testing Windows: four quarters of the year.
    - January – March
    - April – June
    - July – September
    - October - December

- Best time available: Register as far in advance as possible

- Fifteen available seats per testing session.

- Results (P/F): e-mail notification from NCEES within 7-10 days.
Eligibility / Venue

Can I choose to take pencil and paper version?

- No
- FE and FS exams will be offered only on computers at approved Pearson VUE testing centers.
  - [http://cbt.ncees.org/where-will-i-take-my-exam/](http://cbt.ncees.org/where-will-i-take-my-exam/)
  - Baton Rouge, Metairie, Shreveport
FE Exam specifications

- Total Duration of Exam: 6:00
  - A nondisclosure agreement: 0:02
  - Tutorial: 0:08 minutes
  - Exam length: 5:20
  - Scheduled Break: 0:25

- Test make up
    - Chemical
    - Civil
    - Electrical/ Computer
    - Environmental
    - Industrial
    - Mechanical
    - Others
  - 110 multiple choice questions

- Answer all questions
- Passing score
  - Expert committee
  - Level of performance
    - Corresponds with minimal competence in that discipline
Discipline Specific Specifications can be found at:

- **Chemical**

- **Civil**

- **Electrical and Computer**

- **Environmental**

- **Industrial**

- **Mechanical**

- **Other Disciplines**
FE Exam specifications – Example of Industrial

1. **Mathematics** 8–12
   - A. Analytic geometry
   - B. Calculus
   - C. Matrix operations
   - D. Vector analysis
   - E. Linear algebra
   
2. **Engineering Sciences** 8–12
   - A. Work, energy, and power
   - B. Material properties and selection
   - C. Charge, energy, current, voltage, and power

3. **Ethics and Professional Practice** 8–12
   - A. Codes of ethics and licensure
   - B. Agreements and contracts
   - C. Professional, ethical, and legal responsibility
   - D. Public protection and regulatory issues

4. **Engineering Economics** 8–12
   - A. Discounted cash flows (PMT, EAC, PW, IRR, amortization)
   - B. Types and breakdown of costs (e.g., fixed, variable, direct and indirect labor)
   - C. Cost analyses (e.g., benefit-cost, breakeven, minimum cost, overhead)
   - D. Accounting (financial statements and overhead cost allocation)
   - E. Cost estimation
   - F. Depreciation and taxes
   - G. Capital budgeting

5. **Probability and Statistics** 8–12
   - A. Combinatorics (e.g., combinations, permutations)
   - B. Probability distributions (e.g., normal, binomial, empirical)
   - C. Conditional probabilities
   - D. Sampling distributions, sample sizes, and statistics (e.g., central tendency, dispersion)
   - E. Estimation (e.g., point, confidence intervals)
   - F. Hypothesis testing
   - G. Regression (linear, multiple)
   - H. System reliability (e.g., single components, parallel and series systems)
   - I. Design of experiments (e.g., ANOVA, factorial designs)

6. **Modelling and Computations** 8–12
   - A. Algorithm and logic development (e.g., flowcharts, pseudocode)
   - B. Database (e.g., types, information content, relational)
   - C. Decision theory (e.g., uncertainty, risk, utility, decision trees)
   - D. Optimization modeling (e.g., decision variables, objective functions, and constraints)
   - E. Linear programming (e.g., formulation, primal, dual, graphical solutions)
   - F. Mathematical programming (e.g., network, integer, dynamic, transportation assignment)
   - G. Stochastic models (e.g., queuing, Markov, reliability)
   - H. Simulation

7. **Industrial Management** 8–12
   - A. Principles (e.g., planning, organizing, motivational theory)
   - B. Tools of management (e.g., MBO, reengineering, organizational structure)
   - C. Project management (e.g., scheduling, PERT, CPM)
   - D. Productivity measures

8. **Manufacturing, Production, and Service Systems** 8–12
   - A. Manufacturing process
   - B. Manufacturing systems (e.g., cellular, group technology, flexible)
   - C. Process design (e.g., resources, equipment selection, line balancing)
   - D. Inventory analysis (e.g., EOQ, safety stock)
   - E. Forecasting
   - F. Scheduling (e.g., sequencing, cycle time, material control)
   - G. Aggregate planning
   - H. Production planning (e.g., JIT, MRP, ERP)
   - I. Lean enterprises
   - J. Automation concepts (e.g., robotics, CIM)
   - K. Sustainable manufacturing (e.g., energy efficiency, waste reduction)
   - L. Value engineering

9. **Facilities and Logistics** 8–12
   - A. Flow measurements and analysis (e.g., front-to-charts, flow planning)
   - B. Layouts (e.g., types, distance metrics, planning, evaluation)
   - C. Location analysis (e.g., single- and multiple-facility location, warehouse)
   - D. Process capacity analysis (e.g., number of machines and people, trade-off)
   - E. Material handling capacity analysis
   - F. Supply chain management and design

10. **Human Factors, Ergonomics, and Safety** 8–12
    - A. Hazard identification and risk assessment

11. **Work Design** 8–12
    - A. Methods analysis (e.g., charting, workstation design, motion economy)
    - B. Time study (e.g., time standards, allowances)
    - C. Predefined time standard systems (e.g., MOCT, MTM)
    - D. Work sampling
    - E. Learning curves

12. **Quality** 8–12
    - A. Six sigma
    - B. Management and planning tools (e.g., fishbone, Fanto, QFD, TQM)
    - C. Control charts
    - D. Process capability and specifications
    - E. Sampling plans
    - F. Design of experiments for quality improvement
<table>
<thead>
<tr>
<th>Discipline</th>
<th>Chemical</th>
<th>Civil</th>
<th>Electrical</th>
<th>Environmental</th>
<th>Industrial</th>
<th>Mechanical</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Sciences</td>
<td>Computational Tools</td>
<td>Ethics and Professional Practice</td>
<td>Ethics and Professional Practice</td>
<td>Ethics and Professional Practice</td>
<td>Computational Tools</td>
<td>Chemistry</td>
<td></td>
</tr>
<tr>
<td>Computational Tools</td>
<td>Ethics and Professional Practice</td>
<td>Engineering Economics</td>
<td>Engineering Economics</td>
<td>Engineering Economics</td>
<td>Ethics and Professional Practice</td>
<td>Instrumentation and Data Acquisition</td>
<td></td>
</tr>
<tr>
<td>Chemistry</td>
<td>Statics</td>
<td>Engineering Sciences</td>
<td>Environmental Science and Chemistry</td>
<td>Modelling and Computations</td>
<td>Electricity and Magnetism</td>
<td>Safety, Health, and Environment</td>
<td></td>
</tr>
<tr>
<td>Fluid Mechanics/Dynamics</td>
<td>Dynamics</td>
<td>Circuit Analysis (DC and AC Steady State)</td>
<td>Risk Assessment</td>
<td>Industrial Management</td>
<td>Statics</td>
<td>Engineering Economics</td>
<td></td>
</tr>
<tr>
<td>Thermodynamics</td>
<td>Mechanics of Materials</td>
<td>Linear Systems</td>
<td>Fluid Mechanics</td>
<td>Manufacturing, Production, and Service Systems</td>
<td>Dynamics, Kinematics, and Vibrations</td>
<td>Statics</td>
<td></td>
</tr>
<tr>
<td>Material/Energy Balances</td>
<td>Materials</td>
<td>Signal Processing</td>
<td>Thermodynamics</td>
<td>Facilities and Logistics</td>
<td>Mechanics of Materials</td>
<td>Dynamics</td>
<td></td>
</tr>
<tr>
<td>Mass Transfer and Separation</td>
<td>Hydraulics and Hydrologic Systems</td>
<td>Power</td>
<td>Water and Wastewater</td>
<td>Work Design</td>
<td>Fluid Mechanics</td>
<td>Materials Science</td>
<td></td>
</tr>
<tr>
<td>Chemical Reaction Engineering</td>
<td>Structural Analysis</td>
<td>Electromagnetics</td>
<td>Air Quality</td>
<td>Quality</td>
<td>Thermodynamics</td>
<td>Fluid Mechanics and Dynamics of Liquids</td>
<td></td>
</tr>
<tr>
<td>Process Control</td>
<td>Geotechnical Engineering</td>
<td>Communications</td>
<td>Groundwater and Soils</td>
<td>Heat Transfer</td>
<td>Measurements, Instrumentation, and Controls</td>
<td>Electricity, Power, and Magnetism</td>
<td></td>
</tr>
<tr>
<td>Safety, Health, and Environment</td>
<td>Transportation Engineering</td>
<td>Computer Networks</td>
<td></td>
<td>Mechanical Design and Analysis</td>
<td></td>
<td>Heat, Mass, and Energy Transfer</td>
<td></td>
</tr>
</tbody>
</table>
FE Exam specifications -- What can you bring to the exam room?

- Enhanced security for exam content
  - Check-in: government issued ID, photo taken, and palm-vein scan
  - *Watch the video*

- Permitted
  - Calculators
  - Check Calculator Policy
  - Small dry-erase board will be supplied for calculations
  - FE Reference Manual will be embedded in the computer in a searchable pdf file format
  - Watch the video
Suggestions for Taking the FE Exam

- Start with subject areas you are familiar with
  - Stronger areas to weaker areas.

- Manage your time wisely
  - Don’t spend more than 3-5 minutes on a question
  - return to the question later
  - At about 20 minutes before finish time
    » return to the skipped questions
  - At about 5 minutes from the end, guess
    » Wrong answers have no penalty
Useful Web site

- www.eng.lsu.edu
- www.ncees.org
- www.lapels.com
Good Luck