

Fundamentals of Engineering (FE) Information Packet

Registration

<http://www.els-examreg.org/utah.php>

What review courses are available?

Free College of Engineering Review sessions, usually Friday afternoons beginning about 9 weeks before the exam.

Contact Ashley Paulsen, College of Engineering Dean's Office phone 581-4528 or email her at ashley.paulsen@utah.edu

FE/EIT Examination Review Course, Salt Lake City Community College (SLCC), Summer Course. Regular SLCC tuition will apply.

Contact Nick Safai, Professor, SLCC Phone: (801) 957-4785 Email: safaini@slcc.edu OR nick.safai@slcc.edu

What kinds of study materials are available?

General website from NCEES

http://www.ncees.org/exams/study_materials/

NCEES publishes study materials in the form of sample questions, practice tests, and/or supplied-reference listings. They come in a variety of formats: book (printed), CD-ROM, PDF, or online interactive.

Title	Format	Price	Description / purchase
FE Supplied-Reference Handbook (free preview , http://www.ncees.org/exams/study_materials/fe_handbook/index.php)	book	\$13.95	New edition coming in mid-June!
FE Sample Questions and Solutions	book and CD-ROM	\$34.95	New edition coming in mid-June!
FE Internet Diagnostic Exams <i>(You must purchase the FE diagnostic exams separately from the books and CD-ROMs listed on the NCEES Store.)</i>	online interactive	\$29.95	New diagnostic exams coming soon!

Webpages:

www.eitexam.com

This gives you access to self study material, generate a FE exam, and you can generate a practice test.

www.ppi2pass.com

This web page you can generate a full exam and get test results for \$5 per exam. You can also gain access to a question and answer section.

Supplied Reference Handbook http://www.ncees.org/exams/study_materials/fe_handbook/index.php

NCEES offers the FE Supplied-Reference Handbook, 7th Edition (© 2005), in its entirety as a PDF file that may be downloaded free of charge. A bound copy may also be purchased from NCEES. The *FE Supplied-Reference Handbook* is the only reference material that may be used during the Fundamentals of Engineering (FE) exam, so you may wish to become familiar with the contents before exam day.

Topics Covered

- [Cover, Foreword, and Table of Contents](#) (250KB) • [Units of Measurement](#) (184KB)
- [Conversion Factors](#) (131KB) • [Mathematics](#) (454KB)
- [Engineering Probability and Statistics](#) (340KB) • [Statics](#) (252KB)
- [Dynamics](#) (359KB) • [Mechanics of Materials](#) (325KB) • [Fluid Mechanics](#) (623KB)
- [Thermodynamics](#) (1.14MB) • [Heat Transfer](#) (307KB) • [Transport Phenomena](#) (168KB)
- [Biology](#) (411KB) • [Chemistry](#) (225KB) • [Materials Science / Structure of Matter](#) (500KB) • [Measurements, and Controls](#) (330KB) • [Computer Spreadsheets](#) (137KB)
- [Engineering Economics](#) (236KB) • [Ethics](#) (233KB) • [Chemical Engineering](#) (340KB)
- [Civil Engineering](#) (2.34MB) • [Environmental Engineering](#) (767KB)
- [Electrical and Computer Engineering](#) (658KB) • [Industrial Engineering](#) (527KB)
- [Mechanical Engineering](#) (764KB) • [Index](#) (185KB) • [School/Institution Codes](#) (162KB)

Calculators Allowed

This is the list of the calculators that will be allowed in the 2007 exams: Hewlett Packard-HP 33S, Casio FX115MS, Casio- FX115MSPlus, Texas Instruments-TI 30X IIS, or Texas Instruments- TI 36X Solar. For more information, please see the Calculator Policy at www.ncees.org or call NCEES headquarters at 864-654-6824.

FE Exam Specifications

The next 7 pages is what is covered in the various sections of the exam. Please go to the NCEES web page for the most up-to-date examination materials.

http://www.ncees.org/exams/fundamentals/fe_exam_specs.pdf.

NATIONAL COUNCIL OF EXAMINERS FOR ENGINEERING AND SURVEYING

Fundamentals of Engineering (FE) Examination

Effective October 2005

- The FE examination is an 8-hour supplied-reference examination: 120 questions in the 4-hour morning session and 60 questions in the 4-hour afternoon session.
- The afternoon session is administered in the following seven modules—Chemical, Civil, Electrical, Environmental, Industrial, Mechanical, and Other/General engineering.
- Examinees work all questions in the morning session and all questions in the afternoon module they have chosen.

MORNING SESSION (120 questions in 12 topic areas)

Topic Area	Approximate Percentage of Test Content
I. Mathematics	15%
A. Analytic geometry	
B. Integral calculus	
C. Matrix operations	
D. Roots of equations	
E. Vector analysis	
F. Differential equations	
G. Differential calculus	
II. Engineering Probability and Statistics	7%
A. Measures of central tendencies and dispersions (e.g., mean, mode, standard deviation)	
B. Probability distributions (e.g., discrete, continuous, normal, binomial)	
C. Conditional probabilities	
D. Estimation (e.g., point, confidence intervals) for a single mean	
E. Regression and curve fitting	
F. Expected value (weighted average) in decision-making	
G. Hypothesis testing	
III. Chemistry	9%
A. Nomenclature	
B. Oxidation and reduction	
C. Periodic table	
D. States of matter	
E. Acids and bases	
F. Equations (e.g., stoichiometry)	
G. Equilibrium	
H. Metals and nonmetals	
IV. Computers	7%
A. Terminology (e.g., memory types, CPU, baud rates, Internet)	
B. Spreadsheets (e.g., addresses, interpretation, "what if," copying formulas)	
C. Structured programming (e.g., assignment statements, loops and branches, function calls)	
V. Ethics and Business Practices	7%
A. Code of ethics (professional and technical societies)	
B. Agreements and contracts	
C. Ethical versus legal	
D. Professional liability	
E. Public protection issues (e.g., licensing boards)	

- VI. Engineering Economics** **8%**
- A. Discounted cash flow (e.g., equivalence, PW, equivalent annual FW, rate of return)
 - B. Cost (e.g., incremental, average, sunk, estimating)
 - C. Analyses (e.g., breakeven, benefit-cost)
 - D. Uncertainty (e.g., expected value and risk)
- VII. Engineering Mechanics (Statics and Dynamics)** **10%**
- A. Resultants of force systems
 - B. Centroid of area
 - C. Concurrent force systems
 - D. Equilibrium of rigid bodies
 - E. Frames and trusses
 - F. Area moments of inertia
 - G. Linear motion (e.g., force, mass, acceleration, momentum)
 - H. Angular motion (e.g., torque, inertia, acceleration, momentum)
 - I. Friction
 - J. Mass moments of inertia
 - K. Impulse and momentum applied to:
 - 1. particles
 - 2. rigid bodies
 - L. Work, energy, and power as applied to:
 - 1. particles
 - 2. rigid bodies
- VIII. Strength of Materials** **7%**
- A. Shear and moment diagrams
 - B. Stress types (e.g., normal, shear, bending, torsion)
 - C. Stress strain caused by:
 - 1. axial loads
 - 2. bending loads
 - 3. torsion
 - 4. shear
 - D. Deformations (e.g., axial, bending, torsion)
 - E. Combined stresses
 - F. Columns
 - G. Indeterminant analysis
 - H. Plastic versus elastic deformation
- IX. Material Properties** **7%**
- A. Properties
 - 1. chemical
 - 2. electrical
 - 3. mechanical
 - 4. physical
 - B. Corrosion mechanisms and control
 - C. Materials
 - 1. engineered materials
 - 2. ferrous metals
 - 3. nonferrous metals
- X. Fluid Mechanics** **7%**
- A. Flow measurement
 - B. Fluid properties
 - C. Fluid statics
 - D. Energy, impulse, and momentum equations
 - E. Pipe and other internal flow

XI. Electricity and Magnetism **9%**

- A. Charge, energy, current, voltage, power
- B. Work done in moving a charge in an electric field (relationship between voltage and work)
- C. Force between charges
- D. Current and voltage laws (Kirchhoff, Ohm)
- E. Equivalent circuits (series, parallel)
- F. Capacitance and inductance
- G. Reactance and impedance, susceptance and admittance
- H. AC circuits
- I. Basic complex algebra

XII. Thermodynamics **7%**

- A. Thermodynamic laws (e.g., 1st Law, 2nd Law)
- B. Energy, heat, and work
- C. Availability and reversibility
- D. Cycles
- E. Ideal gases
- F. Mixture of gases
- G. Phase changes
- H. Heat transfer
- I. Properties of:
 - 1. enthalpy
 - 2. entropy

AFTERNOON SESSION IN CIVIL ENGINEERING (60 questions in 9 topic areas)

Topic Area	Approximate Percentage of Test Content
I. Surveying	11%
A. Angles, distances, and trigonometry	
B. Area computations	
C. Closure	
D. Coordinate systems (e.g., GPS, state plane)	
E. Curves (vertical and horizontal)	
F. Earthwork and volume computations	
G. Leveling (e.g., differential, elevations, percent grades)	
II. Hydraulics and Hydrologic Systems	12%
A. Basic hydrology (e.g., infiltration, rainfall, runoff, detention, flood flows, watersheds)	
B. Basic hydraulics (e.g., Manning equation, Bernoulli theorem, open-channel flow, pipe flow)	
C. Pumping systems (water and wastewater)	
D. Municipal water distribution systems	
E. Reservoirs (e.g., dams, routing, spillways)	
F. Groundwater (e.g., flow, wells, drawdown)	
G. Sewer collection systems (storm and sanitary)	
III. Soil Mechanics and Foundations	15%
A. Index properties and soil classifications	
B. Phase relations (air-water-solid)	
C. Laboratory and field tests	
D. Effective stress (buoyancy)	
E. Retaining walls (e.g., active pressure/passive pressure)	
F. Shear strength	
G. Bearing capacity (cohesive and noncohesive)	
H. Foundation types (e.g., spread footings, piles, wall footings, mats)	
I. Consolidation and differential settlement	
J. Seepage	
K. Slope stability (e.g., fills, embankments, cuts, dams)	
L. Soil stabilization (e.g., chemical additives, geosynthetics)	
IV. Environmental Engineering	12%
A. Water quality (ground and surface)	
B. Air quality	
C. Solid/hazardous waste	
D. Sanitary sewer system loads	
E. Basic tests (e.g., water, wastewater, air)	
F. Environmental regulations	
G. Water treatment and wastewater treatment (e.g., primary, secondary, tertiary)	

- V. Transportation** **12%**
 - A. Streets and highways
 - 1. geometric design
 - 2. pavement design
 - 3. intersection design
 - B. Traffic analysis and control
 - 1. safety
 - 2. capacity
 - 3. traffic flow
 - 4. traffic control devices

- VI. Structural Analysis** **10%**
 - A. Force analysis of statically determinant beams, trusses and frames
 - B. Deflection analysis of statically determinant beams, trusses and frames
 - C. Stability analysis of beams, trusses and frames
 - D. Column analysis (e.g., buckling, boundary conditions)
 - E. Loads and load paths (e.g., dead, live, moving)
 - F. Elementary statically indeterminate structures

- VII. Structural Design** **10%**
 - A. Codes (e.g., AISC, ACI, NDS, AISI)
 - B. Design procedures for steel components (e.g., beams, columns, beam-columns, tension members, connections)
 - C. Design procedures for concrete components (e.g., beams, slabs, columns, walls, footings)

- VIII. Construction Management** **10%**
 - A. Procurement methods (e.g., design-build, design-bid-build, qualifications based)
 - B. Allocation of resources (e.g., labor, equipment, materials, money, time)
 - C. Contracts/contract law
 - D. Project scheduling (e.g., CPM, PERT)
 - E. Engineering economics
 - F. Project management (e.g., owner/contractor/client relations, safety)
 - G. Construction estimating

- IX. Materials** **8%**
 - A. Concrete mix design
 - B. Asphalt mix design
 - C. Test methods (e.g., steel, concrete, aggregates, asphalt)
 - D. Properties of aggregates
 - E. Engineering properties of metals

AFTERNOON SESSION IN OTHER/GENERAL ENGINEERING (60 questions in 9 topic areas)

Topic Area	Approximate Percentage of Test Content
I. Advanced Engineering Mathematics A. Differential equations B. Partial differential calculus C. Numerical solutions (e.g., differential equations, algebraic equations) D. Linear algebra E. Vector analysis	10%
II. Engineering Probability and Statistics A. Sample distributions and sizes B. Design of experiments C. Hypothesis testing D. Goodness of fit (coefficient of correlation, chi square) E. Estimation (e.g., point, confidence intervals) for two means	9%
III. Biology A. Cellular biology (e.g., structure, growth, cell organization) B. Toxicology (e.g., human, environmental) C. Industrial hygiene [e.g., personnel protection equipment (PPE), carcinogens] D. Bioprocessing (e.g., fermentation, waste treatment, digestion)	5%
IV. Engineering Economics A. Cost estimating B. Project selection C. Lease/buy/make D. Replacement analysis (e.g., optimal economic life)	10%
V. Application of Engineering Mechanics A. Stability analysis of beams, trusses, and frames B. Deflection analysis C. Failure theory (e.g., static and dynamic) D. Failure analysis (e.g., creep, fatigue, fracture, buckling)	13%
VI. Engineering of Materials A. Material properties of: <ol style="list-style-type: none"> 1. metals 2. plastics 3. composites 4. concrete 	11%
VII. Fluids A. Basic hydraulics (e.g., Manning equation, Bernoulli theorem, open-channel flow, pipe flow) B. Laminar and turbulent flow C. Friction losses (e.g., pipes, valves, fittings) D. Flow measurement E. Dimensionless numbers (e.g., Reynolds number) F. Fluid transport systems (e.g., pipes, ducts, series/parallel operations) G. Pumps, turbines, and compressors H. Lift/drag	15%

- VIII. Electricity and Magnetism** **12%**
- A. Equivalent circuits (Norton, Thevenin)
 - B. AC circuits (frequency domain)
 - C. Network analysis (Kirchhoff laws)
 - D. RLC circuits
 - E. Sensors and instrumentation
 - F. Electrical machines
- IX. Thermodynamics and Heat Transfer** **15%**
- A. Thermodynamic properties (e.g., entropy, enthalpy, heat capacity)
 - B. Thermodynamic processes (e.g., isothermal, adiabatic, reversible, irreversible)
 - C. Equations of state (ideal and real gases)
 - D. Conduction, convection, and radiation heat transfer
 - E. Mass and energy balances
 - F. Property and phase diagrams (e.g., T-s, h-P)
 - G. Tables of thermodynamic properties
 - H. Cyclic processes and efficiency (e.g., refrigeration, power)
 - I. Phase equilibrium and phase change
 - J. Thermodynamic equilibrium
 - K. Combustion and combustion products (e.g., CO, CO₂, NO_x, ash, particulates)
 - L. Psychrometrics (e.g., humidity)

Examinee Exam-Day Checklist

- Bring only NCEES approved calculators. View the approved list at www.els-examreg.org.
- Bring a current, signed, government-issued photographic identification. *University/student IDs are **NOT** acceptable.*
- Bring this Examination Admission Authorization.
- Arrive on time. Late arrivals are **NOT** admitted under any circumstances.
- Do not wear cologne, perfume, or other fragrance to the exam site.
- Bring a lunch. Restaurant facilities are not always available.
- Bring earplugs. Unexpected noises could occur.
- Wear a watch and turn off the beeping function. Clocks are not always visible.
- Leave your cell phone at home or in your car.
- Leave hats with brims or bills at home or in your car.
- Leave pencils, erasers, and extra lead at home or in your car.
- Prepare for cooler or warmer climate in the examination room. Room temperature could vary.
- Do not bring flags/Post-its™ into the FE or FS exam.
- If you are taking the FE or FS exam, pack all personal items in a clear bag. No purses or backpacks are permitted in the exam room.

Exam results are mailed approximately 10-12 weeks after the exam date. Results may **NOT** be obtained over the phone. Exam results will be reported as pass/fail **only**. Numerical scores are not reported.

If you have a change of address, it is your responsibility to submit a change of address form to ELSEES and your state board. The form can be found at www.els-examreg.org. It is your responsibility to confirm receipt of the form.

If you fail to appear or are late for the exam and are not admitted, or if you do not pass the exam, or are dismissed for a policy violation, you will be required to register again and pay the appropriate fee for any future exam you wish to take. You may **NOT** transfer your registration or exam fees to a future administration. Registration information will be available after December 15 for the April exam and after July 1 for the October exam. Please check the ELSEES Web site at www.els-examreg.org or call 877-536-7729 for registration information.

NCEES Tip Line: To report a suspected exam security breach or irregularity, you may contact NCEES, anonymously if you wish, by completing an online form at www.ncees.org or calling our toll-free number, 800-250-3196, ext. 296, and leaving a message. You may also contact Bob Whorton, P.E., NCEES Compliance and Security Manager, at 800-250-3196, ext. 467.