Ethics & Professional Practice Knowledge

- 4 – 6 problems
- Codes of ethics
  - Professional & technical societies
  - Professional liability
  - Licensure
- Sustainability & sustainable design
- Professional skills
  - Public policy, management, & design
- Contracts & contract law
- Sections in FE Reference Handbook
  - Ethics

Ethics

Codes of Ethics

NCEES Model Law

Ethical Considerations
Codes of Ethics
Creeds, Rules, Statutes, Canons, & Codes

- Creeds, rules, statutes, canons, and codes all attempt to complete the guidance needed for an engineer to do “... the correct thing.”
- Creed is a statement or oath, often religious in nature, taken or assented to by an individual in ceremonies
  ▫ Engineers’ Creed adopted by the National Society of Professional Engineers (NSPE)
- Rule is a guide (principle, standard, or norm) for conduct and action in a certain situation, or a regulation governing procedure
- Statutory rule, or statute, is enacted by the legislative branch of state or federal government and carries the weight of law
- Canon is an individual principle or body of principles, rules, standards, or norms
- Code is a system of principles or rules
  ▫ Code of ethics of the American Society of Civil Engineers (ASCE) contains 7 canons

Codes of Ethics
Creeds, Rules, Statutes, Canons, & Codes Example

Relative to the practice of engineering, which one of the following best defines “ethics”?
(A) application of United States laws
(B) rules of conduct
(C) personal values
(D) recognition of cultural differences

Codes of Ethics
Purpose of a Code of Ethics

- Purpose of ethical guidelines is to guide the conduct and decision making of engineers
- Fundamental to ethical codes is the requirement that engineers render faithful, honest, professional service
- In providing such service, engineers must represent the interests of their employers or clients and, at the same time, protect public health, safety, and welfare
- Many legal actions can be violations of codes of ethical or professional behavior
  ▫ An engineer’s contract with a client may give the engineer the right to assign the engineer’s responsibilities, but doing so without informing the client would be unethical
- Ethical guidelines can be categorized on the basis of who is affected by the engineer’s actions – the client, vendors and suppliers, other engineers, or the public at large
Codes of Ethics

Purpose of a Code of Ethics Example

Complete the sentence: "Guidelines of ethical behavior among engineers are needed because:

(A) engineers are analytical and they don’t always think in terms of right or wrong."

(B) all people, including engineers, are inherently unethical."

(C) rules of ethics are easily forgotten."

(D) it is for engineers to take advantage of clients.”

NCEES Model Law

Licensee’s Obligation to Society Example

While working to revise the design of the suspension for a popular car, an engineer discovers a flaw in the design currently being proposed. Based on a statistical analysis, the company determined that although this mistake is likely to cause a recall, the number of vehicles sold each year, it would be prohibitively expensive to do a recall to repair the part. Accordingly, there seems to be no way to correct the mistake. What should the engineer do?

NCEES Model Law

Licensee’s Obligation to Employer & Clients Example

Plan smuggling is best defined as the

(A) legal action of signing off on a project you did’t design but did accept money for

(B) legal action of signing off on a project you did’t design but didn’t accept money for

(C) illegal action of signing off on a project you didn’t design but did check

(D) illegal action of signing off on a project you didn’t design or check
Ethical Considerations

Ethical Priorities

• Frequently conflicting demands on engineers
• The ethics of engineers dealing with others need to be considered in the following order from highest to lowest priority:
  1. Society and the public
  2. Law
  3. Engineering profession
  4. Engineer’s client
  5. Engineer’s firm
  6. Other involved engineers
  7. Engineer personally

Ethical Considerations

Ethical Priorities Example

To whom/what is a registered engineer’s foremost responsibility?

(A) client
(B) employer
(C) state and federal laws
(D) public welfare
Ethical Considerations
Dealing with Clients & Employers Example

You are an engineer in charge of reviewing bids for an upcoming project. One of the contractors bidding the job is your former employer. The former employer held you in a senior to mid-corp. Which of the following should you do?

I. say nothing
II. inform your present employer of the situation
III. remain objective when reviewing the bids

(A) II only
(B) I and II
(C) I and III
(D) II and III

Ethical Considerations
Dealing with Suppliers Example

In dealing with suppliers, an engineer may
(A) usually delay vendor performance if the client agrees
(B) spend personal time outside of the contract to ensure adequate performance
(C) prepare plans containing ambiguous design-build references as cost-saving measures
(D) enforce plans and specifications to the letter, without regard to fairness

Ethical Considerations
Dealing with (and Affecting) the Public Example

Whistle-blowing is best described as calling public attention to

(A) your own previous unethical behavior
(B) unethical behavior of employees under your control
(C) serious illegal behavior by your employer
(D) wrongdoing or illegal behavior in a government agency you are monitoring as a private individual
Ethical Considerations

Competitive Bidding Example

Complete the sentence: "The U.S. Department of Justice's successful action in the 1970s against engineering codes of ethics that formally prohibited competitive bidding was based on the premise that:

(A) competitive bidding allowed minority firms to participate.

(B) competitive bidding was required by many government contracts.

(C) the prohibitions-related antitrust statutes.

4. engineering societies did not have the authority to prohibit competitive bidding.

Professional Practice

Agreements & Contracts

• A legally binding agreement or promise to exchange goods or services

• Types:
  - Written contract
    - A clear, specific, and definite offer with no room for ambiguity or misunderstanding
    - Some form of conditional future consideration (i.e., payment)
    - Must be an acceptance of the offer
  - Verbal
  - Letter of agreement
  - Purchase order

• Include the following:
  - Introduction, preamble, or preface indicating the purpose of the contract
  - Name, address, and business forms of both contracting parties
  - Signature date of the agreement
  - Effective date of the agreement (if different from the signature date)
  - Duties and obligations of both parties
  - Deadlines and required service dates
  - Fee amount
  - Fee schedule and payment terms
  - Agreement expiration date
  - Standard boilerplate clauses
  - Signatures of parties or their agents
  - Declaration of authority of the signatories to bind the contracting parties
  - Supporting documents
Agreements & Contracts

General Contracts Example

Which feature is NOT a standard feature of a written construction contract?

(A) Identification of both parties
(B) Specific details of the obligations of both parties
(C) Boilerplate clauses
(D) Subcontracts

31

Agreements & Contracts

Standard Boilerplate Clauses

• Have specific wordings that should not normally be changed
• Common clauses:
  ▫ Delays and inadequate performance due to war, strikes, and acts of God and nature are forgiven
  ▫ Contract document is the complete agreement, superseding all prior verbal and written agreements
  ▫ Contract can be modified or canceled only in writing
  ▫ Parties to the contract that are determined to be in breach of the agreement may have the contract modified to accomplish their intended purposes without affecting the remainder of the contract
  ▫ Time is of the essence
  ▫ The subject headings of the agreement paragraphs are for convenience only and do not control the meaning of the paragraphs
  ▫ The laws of the state in which the contract is signed must be used to interpret and govern the contract
  ▫ Disagreements shall be arbitrated according to the rules of the American Arbitration Association
  ▫ Any lawsuits related to the contract must be filed in the county and state in which the contract is signed
  ▫ All notices provided for in the agreement must be in writing and sent to the address in the agreement
  ▫ If any legal action is necessary, the prevailing party is entitled to an award of reasonable attorneys' and court fees
  ▫ Consequential damages are non-recoverable in a lawsuit

32

Agreements & Contracts

Standard Boilerplate Clauses Example

An engineering consultant has signed a standard owner-engineer contract to build a series of bridges in time for the owner to present a proposal to a financing committee. After the scale models have been built, it is destroyed in a building fire that consumes the consultant’s building. The consultant is unable to rebuild the model in time. A breach of contract judgment against the consultant is most likely NOT obtainable due to which legal argument?

(A) variance contract
(B) privity of contract
(C) force majeure
(D) strict liability in tort
Agreements & Contracts
Consulting Fee Structure

• Compensation for consulting engineering services can incorporate one or more of the following concepts:
  ▫ Lump-sum fee: Predetermined fee agreed upon by client and engineer
  ▫ Unit price: Contract fees are based on estimated quantities and unit pricing. Often used in combination with a lump-sum fee
  ▫ Cost plus fixed fee: All costs (labor, material, travel, etc.) incurred by the engineer are paid by the client
  ▫ Per diem fee: The engineer is paid a specific sum for each day spent on the job. Usually, certain direct expenses (e.g., travel and reproduction) are billed in addition to the per diem rate

Agreements & Contracts
Consulting Fee Structure Continued

• Salary plus: Client pays for the employees on an engineer’s payroll (the salary) plus an additional percentage to cover indirect overhead and profit plus certain direct expenses
• Retainer: Minimum amount paid by the client, usually in total and in advance, for a normal amount of work expected during an agreed-upon period. Usually, none of the retainer is returned, regardless of how little work the engineer performed
• Incentive: Based on established target costs and fees and lists minimum and maximum fees and an adjustment formula. The formula may be based on performance criteria such as budget, quality, and schedule. Once the project is complete, payment is calculated based on the formula
• Percentage of construction cost: Pays the architect and/or the engineer a percentage of the final total cost of the project. Costs of land, financing, and legal fees are generally not included in the construction cost, and other costs (plan revisions, project management labor, value engineering, etc.) are billed separately

Agreements & Contracts
Consulting Fee Structure Example

Which fee structure is a nonrefundable advance paid to a consultant?
(A) per diem fee
(B) retainer
(C) lump-sum fee
(D) cost plus fixed fee
Professional Liability
Breach of Contract, Negligence, Misrepresentation, & Fraud

- Breach of contract occurs when one of the parties fails to satisfy all of its obligations under a contract.
  - Can be willful, as in a contractor walking off a construction job.
  - Can be unintentional, as in providing less than adequate workmanship.
- Material breach is defined as non-performance that results in something substantially less than or different from what the contract intended.
- Negligence is an action, willful or unwillful, taken without proper care or consideration for safety, resulting in damage to property or injury to persons.
- Punitive damages are available if the breaching party was fraudulent in obtaining the contract.
- A fraudulent act is basically a special case of misrepresentation (i.e., an intentional false statement known to be false at the time it is made).
- When a contract is involved, misrepresentation can be a breach of that contract (i.e., fraud).
- Contributory negligence can be a breach by the injured party (i.e., failure).
- Extremely difficult to prove compensatory fraud (i.e., fraud for which damages are available).
  - Proving fraud requires showing beyond a reasonable doubt:
    (a) a reckless or intentional misstatement of a material fact,
    (b) an intention to deceive,
    (c) it resulted in misleading the innocent party to contract,
    (d) it was to the innocent party's detriment.

Professional Liability
Breach of Contract, Negligence, Misrepresentation, & Fraud
Example

The owner of a construction site is aware that the state driving license of one of its heavy machinery operators has been suspended for multiple driving under the influence (DWI) violations. In order to secure a durable and contract with an outside-oriented-based company, the owner misrepresented the non-drinking status of the construction crew. A serious injury occurs when the operator drives a loader over the leg of a member of the construction crew who was intoxicated. Most likely, the company will be able to obtain a judgment against the operator based on

(A) negligence
(B) breach of contract
(C) misrepresentation
(D) fraud

Professional Liability
Manufacturing & Design Liability

- Case law makes a distinction between design professionals and manufacturers of consumer products.
- Design professionals are generally consultants whose primary product is a design service sold to sophisticated clients.
- Consumer product manufacturers produce specific product lines sold through wholesalers and retailers to the unsophisticated public.
- Law treats design professionals favorably.
- Such professionals are expected to meet a standard of care and skill that can be measured by comparison with the conduct of other professionals.
- In the absence of a contract, design professionals are not held to be guarantors of their work in the strict sense of legal liability.
- Damages incurred due to design errors are recoverable through tort actions, but proving a breach of contract requires showing negligence (i.e., not meeting the standard of care).
Professional Liability
Manufacturing & Design Liability Continued

- Law is much stricter with consumer product manufacturers
- They are held to the standard of strict liability in tort without regard to negligence
- A manufacturer is held liable for all phases of the design and manufacturing of a product being marketed to the public
- Although all defectively designed products can be traced back to a design engineer or team, only the manufacturing company is usually held liable for injury caused by the product
- The company has liability insurance; the product design engineer (who is merely an employee of the company) probably does not
- Unless the product design or manufacturing process is intentionally defective, or unless the defect is known in advance and covered up, the product design engineer will rarely be punished by the courts

Professional Liability
Manufacturing & Design Liability Example

An engineer designs and manufactures a revolutionary racing bicycle. The engineer uses finite element analysis (FEA) software to perfect the design, has the design checked by a reputable authority, and subjects the major components to monotonic testing. After three years of broader-than-anticipated usage, one of the engineer’s bicycle disintegrates in a race, killing the rider. In his defense, the engineer may claim:

(A) privity of contract
(B) standard of care
(C) statute of limitations
(D) contributory negligence

Licensure
About Licensing

- Engineering licensing in the U.S. is an examination process by which a state's board of engineering licensing determines and certifies that an engineer has achieved a minimum level of competence.
- There are many good reasons to become a licensed engineer.
  - For example, you cannot offer consulting engineering services in any state unless you are licensed in that state.
  - Even within a product-oriented corporation, you may find that employment, advancement, and managerial positions are limited to licensed engineers.
- Once you have met the licensing requirements, you will be allowed to use the titles Professional Engineer (PE), Structural Engineer (SE), Registered Engineer (RE), and/or Consulting Engineer (CE) as permitted by your state.
- Each state has its own licensing law.

The U.S. Licensing Procedure

- Similar in all states
- 2 examinations
  - Fundamentals of Engineering (FE) examination, formerly known (and still commonly referred to) as the Engineer-In-Training (EIT) examination
  - Professional Engineering (PE) examination, also known as the Principles and (P&P) examination
    - Designed for engineers who have gained at least four years' post-college work experience in their chosen engineering discipline
- Details of licensing qualifications, experience requirements, minimum education levels, fees, and examination schedules vary from state to state.

National Council of Examiners for Engineering and Surveying (NCEES)

- National Council of Examiners for Engineering and Surveying (NCEES) in Seneca, South Carolina, writes, publishes, distributes, and scores the national FE and PE examinations
- Individual states administer the exams in a uniform, controlled environment as dictated by NCEES
Uniform Examinations

- Although each state has its own licensing law and is free to administer its own exams, none does so for the major disciplines
- All states have chosen to use the NCEES exams
- Exams from all the states are graded by NCEES
- Each state adopts the cut-off passing scores recommended by NCEES
- These practices have led to the term uniform examination

Reciprocity Among States

- With minor exceptions, having a license from one state will not permit you to practice engineering in another state
  - Must have a professional engineering license from each state in which you work
- All states use the NCEES examinations
- If you take and pass the FE or PE examination in one state, your certificate or license will be honored by all of the other states
  - Upon proper application, payment of fees, and proof of your license, you will be issued a license by the new state
  - Although there may be other special requirements imposed by a state, it will not be necessary to retake the FE or PE examinations
- The issuance of an engineering license based on another state's licensing is known as reciprocity or comity