



Engineering Fundamentals

An Introduction to Engineering

Chapter 5

Engineering Ethics



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Learning Objectives

1. Engineering Ethics

Explain what is meant by engineering ethics

2. The Code of Ethics of the National Society of Professional Engineers

Give examples of fundamental canons and rules of practice

3. Engineer's Creed

Explain what is meant by the Engineer's Creed and give examples

4. Academic Dishonesty, Conflict of Interest, Professional Responsibility

Explain what each of these terms mean

Discussion Starter

Read the discussion starter for Chapter 5 on page 125 (10 minutes). You may discuss your thoughts with the student sitting next to you.

- What is your definition for ethics and ethical conduct?
- Was it ethical for Engineer A to offer facilities design and construction services under the facts presented?

Why Is Ethics Important?

- People rely heavily on engineers to provide them with safe and reliable goods and services
- Engineers must perform under a certain standard of professional behavior which requires adherence to the highest principles of ethical conduct
- Mistakes made by unethical and/or incompetent engineers could cost not only money but also more importantly lives

Ethics

Study of morality and the moral choices that we all have to make in our lives

Ethics – Definition

The study of the general nature of morals and of specific moral choices

The rules or standards governing the conduct of the members of a profession

American Heritage

The Code of Ethics of the National Society of Professional Engineers

National Society of Professional Engineers
(NSPE)

Code of Ethics for Engineers

NSPE Code of Ethics for Engineers

Designed to provide **positive stimulus for ethical conduct** as well as helpful guidance and advice concerning the **primary and basic obligations of engineers**. The Code also establishes the ethical guideposts for the NSPE Board of Ethical Review in interpreting ethical dilemmas submitted by engineers, public officials, and members of the public.

Preamble

Engineering is an important and learned profession. As members of this profession, engineers are **expected to exhibit the highest standards of honesty & integrity**. Engineering has a direct and vital impact on the quality of life for all people. Accordingly, the services provided by engineers require **honesty, impartiality, fairness, and equity, and must be dedicated to the protection of the public health, safety, and welfare**. Engineers must perform under a standard of professional behavior that requires adherence to **the highest principles of ethical conduct**.

I. Fundamental Canons

Engineers, in the fulfillment of their professional duties, shall:

1. Hold paramount the safety, health and welfare of the public.
2. Perform services only in areas of their competence.
3. Issue public statements only in an objective and truthful manner.

I. Fundamental Canons

(Cont.)

4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation and usefulness of the profession.

II. Rules of Practice

1. Engineers shall hold paramount the safety, health, and welfare of the public.
2. Engineers shall perform services only in the areas of their competence.
3. Engineers shall issue public statements only in an objective and truthful manner.
4. Engineers shall act for each employer or client as faithful agents or trustees.
5. Engineers shall avoid deceptive acts.

III. Professional Obligations

1. Engineers shall be guided in all their relations by the highest standards of honesty and integrity.
2. Engineers shall at all times strive to serve the public interest.
3. Engineers shall avoid all conduct or practice that deceives the public.
4. Engineers shall not disclose, without consent, confidential information concerning the business affairs or technical processes of any present or former client or employer, or public body on which they serve.

III. Professional Obligations

(Cont.)

5. Engineers shall not be influenced in their professional duties by conflicting interests.
6. Engineers shall not attempt to obtain employment or advancement or professional engagements by untruthfully criticizing other engineers, or by other improper or questionable methods.
7. Engineers shall not attempt to injure, maliciously or falsely, directly or indirectly, the professional reputation, prospects, practice, or employment of other engineers. Engineers who believe others are guilty of unethical or illegal practice shall present such information to the proper authority for action.

III. Professional Obligations

(Cont.)

8. Engineers shall accept personal responsibility for their professional activities, provided, however, that engineers may seek indemnification for services arising out of their practice other than for gross negligence, where the engineer's interests cannot otherwise be protected.
9. Engineers shall give credit for engineering work to those to whom credit is due, and will recognize the proprietary interests of others.

Engineer's Creed

- Approved in June 1954
- Short statement of philosophy of service
- Used in ceremonies or in recognition of individuals
- Used widely in NSPE, state society, and local chapter officer installation ceremonies, licensure certificate presentations, and engineering school graduations

Engineer's Creed

The NSPE Engineer's Creed is:

- To give the utmost of performance
- To participate in none but honest enterprise
- To live and work according to the laws of man and the highest standards of professional conduct
- To place
 - service before profit
 - the honor and standing of the profession before personal advantage, and
 - the public welfare above all other considerations

In humility and with need for Divine guidance, I make this pledge.

Adopted by NSPE, June 1954

Additional Definition

- Academic dishonesty
- Plagiarism
- Conflict of interest
- Contract
- Professional responsibility

2012 Milton F. Lunch Ethics Contest

Facts:

Engineer A works for Company X, which is owned by Engineer B. Company X is currently experiencing financial problems and Engineer B recently created another company, Company Y. Engineer A has learned that Engineer B recently advised clients of Company X to remit payments for work performed by Company X and its employees to Company Y.

Question:

What are Engineer A's ethical obligations under the circumstances?

2013 Milton F. Lunch Ethics Contest

Facts:

A marketing company establishes a Web portal and offers a service to customers whereby customers type in questions on various topics (e.g., law, medicine, accounting, engineering, etc.) and, following the receipt of the responses, which are generally fairly detailed, the customer pays the marketing company what the customer believes the service is worth, plus an access fee for the Web portal.

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(Cont.)

Following receipt of the payment, the marketing company passes along the customer payment to the service provider (lawyer, physician, accountant, engineer, etc.). Engineer A, a structural engineer, wants to know if it would be ethical for him to participate in this type of business.

Question:

Would it be ethical for Engineer A, a structural engineer, to participate in this type of business?

Confidentiality of Engineering Report: Case No. 82-2

Facts:

Engineer A offers a home owner inspection service, whereby he undertakes to perform an engineering inspection of residences by prospective purchasers. Following the inspection, Engineer A renders a written report to the prospective purchaser. Engineer A performed this service for a client (husband and wife) for a fee and prepared a one-page written report, concluding that the residence under consideration was in generally good condition requiring no major repairs, but noting several minor items needing attention.

Confidentiality of Engineering Report: Case No. 82-2

(Cont.)

Engineer A submitted his report to the client showing that a carbon copy was sent to the real estate firm handling the sale of the residence. The client objected that such action prejudiced their interests by lessening their bargaining position with the owners of the residence. They also complained that Engineer A acted unethically in submitting a copy of the report to any others who had not been a party to the agreement for the inspection services.

Question:

Did Engineer A act unethically in submitting a copy of the home inspection report to the real estate firm representing the owners?

Gift Sharing of Hotel Suite: Case No. 87-4

Facts:

Engineer B is director of engineering with a large governmental agency that uses many engineering consultants. Engineer A is a principal in a large engineering firm that performs services for that agency. Both are members of an engineering society that is conducting a two-day seminar in a distant city. Both plan to attend the seminar, and they agree to share costs of a two-bedroom hotel suite in order to have better accommodations.

Question:

Was it ethical for Engineer A and B to share the hotel suite?

Credit for Engineering Work-Design Competition: Case No. 92-1

Facts:

Engineer A is retained by a city to design a bridge as part of an elevated highway system. Engineer A then retains the services of Engineer B, a structural engineer with expertise in horizontal geometry, superstructure design, and elevations to perform certain aspects of the design services. Engineer B designs the bridge's three curved welded plate girder spans, which were critical elements of the bridge design.

Credit for Engineering Work-Design Competition: Case No. 92-1

(Cont.)

Several months following completion of the bridge, Engineer A enters the bridge design into a national organization's bridge design competition.

Question:

Was it ethical for Engineer A to fail to give credit to Engineer B for his part in the design?

Services-Same Services for Different Clients: Case No. 00-3

Facts:

Engineer A, a professional engineer, performs a traffic study for Client X as part of the client's permit application for traffic flow for the development of a store. Engineer A invoices Client X for a complete traffic study.

Later, Client X learns that part of the traffic study provided by Engineer A to Client X was earlier developed by Engineer A for a developer, Client Y, at a nearby location and that Engineer A invoiced Client Y for the complete traffic study.

Services-Same Services for Different Clients: Case No. 00-3

(Cont.)

The second study on a new project for Client X utilized some of the same raw data as was in the report prepared for Client Y. The final conclusion of the engineering study was essentially the same in both studies.

Question:

Was it ethical for Engineer A to charge Client X for the complete traffic study?

Use of Alleged Hazardous Material in a Processing Facility: Case No. 99-11

Facts:

Engineer A is a graduate engineer in a company's manufacturing facility that uses toxic chemicals in its processing operations. Engineer A's job has nothing to do with the use and control of these materials.

A chemical called "MegaX" is used at the site. Recent stories in the news have reported alleged immediate and long-term human genetic hazards from inhalation of or other contact with MegaX. The news items are based on findings from laboratory experiments, which were done on mice, by a graduate student at a well-respected university's physiology department.

Use of Alleged Hazardous Material in a Processing Facility: Case No. 99-11

(Cont.)

Other scientists have neither confirmed nor refuted the experimental findings. Federal and local governments have not made official pronouncements on the subject.

Several colleagues outside of the company have approached Engineer A on the subject and ask Engineer A to “do something” to eliminate the use of MegaX at the processing facility. Engineer A mentions this concern to her manager who tells Engineer A, “Don’t worry, we have an Industrial Safety Specialist who handles that.”

Use of Alleged Hazardous Material in a Processing Facility: Case No. 99-11

(Cont.)

Two months elapse and MegaX is still used in the factory. The controversy in the press continues, but since there is no further scientific evidence pro or con in the matter, the issues remain unresolved. The use of the chemical in the processing facility has increased and now more workers are exposed daily to the substance than was the case two months ago.

Question:

Does Engineer A have an obligation to take further action under the facts and circumstances?

Software Design Testing: NSPEBER Case No. 96-4

Facts:

Engineer A is employed by a software company and is involved in the design of specialized software in connection with the operations of facilities affecting the public health and safety (i.e., nuclear, air quality control, water quality control). As part of the design of a particular software system, Engineer A conducts extensive testing, and although the tests demonstrate that the software is safe to use under existing standards, Engineer A is aware of new draft standards that are about to be released by a standard setting organization—standards that the newly designed software may not meet.

Software Design Testing: NSPEBER Case No. 96-4

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Engineer A is employed by a software company and is involved in the design of specialized software in connection with the operations of facilities affecting the public health and safety (i.e., nuclear, air quality control, water quality control). As part of the design of a particular software system, Engineer A conducts extensive testing, and although the tests demonstrate that the software is safe to use under existing standards, Engineer A is aware of new draft standards that are about to be released by a standard setting organization—standards that the newly designed software may not meet.

Software Design Testing: NSPEBER Case No. 96-4

(Cont.)

Testing is extremely costly, and the company's clients are eager to begin to move forward. The software company is eager to satisfy its clients, protect the software company's finances, and protect existing jobs; but at the same time, the management of the software company wants to be sure that the software is safe to use. A series of tests proposed by Engineer A will likely result in a decision whether to move forward with the use of the software. The tests are costly and will delay the use of the software at least six months, which will put the company at a competitive disadvantage and cost the company a significant amount of money.

Software Design Testing: NSPEBER Case No. 96-4

(Cont.)

Also, delaying implementation will mean the state public service commission utility rates will rise significantly during this time. The company requests Engineer A's recommendation concerning the need for additional software testing.

Question:

Under the Code of Ethics, does Engineer A have a professional obligation to inform his company of the reasons for needed additional testing and his recommendations that it be undertaken?

Whistleblowing: Case No. 82-5

Facts:

Engineer A is employed by a large industrial company that engages in substantial work on defense projects. Engineer A's assigned duties relate to the work of subcontractors, including review of the adequacy and acceptability of the plans for material provided by subcontractors. In the course of this work, Engineer A advised his superiors by memoranda of problems he found with certain submissions of one of the subcontractors, and urged management to reject such work and require the subcontractors to correct the deficiencies he outlined.

Whistleblowing: Case No. 82-5

(Cont.)

Management rejected the comments of Engineer A, particularly his proposal that the work of a particular subcontractor be redesigned because of Engineer A's claim that the subcontractor's submission represented excessive cost and time delays. After the exchange of further memoranda between Engineer A and his management superiors and continued disagreement between Engineer A and management on the issues he raised, management placed a critical memorandum in his personnel file and subsequently placed him on three months' probation, with the further notation that if his job performance did not improve, he would be terminated.

Whistleblowing: Case No. 82-5

(Cont.)

Engineer A has continued to insist that his employer had an obligation to ensure that subcontractors deliver equipment according to the specifications, as he interprets them, and thereby save substantial defense expenditures. He has requested an ethical review and determination of the propriety of his course of action and the degree of ethical responsibility of engineers in such circumstances.

Question:

Does Engineer A have an ethical obligation, or an ethical right, to continue his efforts to secure change in the policy of his employer under these circumstances, or to report his concerns to proper authority?

Academic Qualifications: Case No. 79-5

Facts:

Engineer A received a Bachelor of Science degree in 1940 from a recognized engineering curriculum and subsequently was registered as a professional engineer in two states. Later, he was awarded an earned “Professional Degree” from the same institution. In 1960 he received a Ph.D. degree from an organization that awards degrees on the basis of correspondence without requiring any form of personal attendance or study at the institution and is regarded by state authorities as a “diploma mill.” Engineer A has since listed his Ph.D. degree among his academic qualifications in brochures, correspondence, and otherwise, without indicating its nature.

Academic Qualifications: Case No. 79-5

(Cont.)

Question:

Was Engineer A ethical in citing his Ph.D. degree as an academic qualification under these circumstances?

Advertising–Misstating Credentials: Case No. 92-2

Facts:

Engineer A is an EIT who is employed by a medium-sized consulting engineering firm in a small city. Engineer A has a degree in mechanical engineering and has performed services almost exclusively in the field of mechanical engineering. Engineer A learns that the firm has begun a marketing campaign and in its literature lists Engineer A as an electrical engineer. There are other electrical engineers in the firm. Engineer A alerts the marketing director, also an engineer, to the error in the promotional literature, and the marketing director indicates that the error will be corrected. However, after a period of six months, the error is not corrected.

Advertising–Misstating Credentials: Case No. 92-2

(Cont.)

Question:

Under the circumstances, what actions, if any, should Engineer A take?

Advertising—Statement of Project Success: Case No. 79-6

Facts:

Engineer A published an advertisement in the classified section of a daily newspaper under the heading, “Business Services,” which read in full: “Consulting Engineer for Industry. Can reduce present process heating fuel consumption by 30% to 70% while doubling capacity in same floor space. For more information contact Engineer A, telephone 123-456-7890.”

Question:

Was Engineer A’s advertisement ethical?

Using Technical Proposal of Another Without Consent: Case No. 83-3

Facts:

Engineer B submitted a proposal to a county council following an interview concerning a project. The proposal included technical information and data that the council requested as a basis for the selection. Smith, a staff member of the council, made Engineer B's proposal available to Engineer A. Engineer A used Engineer B's proposal without Engineer B's consent in developing another proposal, which was subsequently submitted to the council. The extent to which Engineer A used Engineer B's information and data is in dispute between the parties.

Using Technical Proposal of Another Without Consent: Case No. 83-3

(Cont.)

Question:

Was it unethical for Engineer A to use Engineer B's proposal without Engineer B's consent in order for Engineer A to develop a proposal that Engineer A subsequently submitted to the council?

Before You Go On

Answer the following questions to test your understanding of the preceding section.

1. In your own words, explain what is meant by ethics.
2. What are engineering ethics and why is it important to have established guidelines, standards, and rules?
3. Give two examples of the fundamental canons of the NSPE's Code of Ethics.
4. Give two examples of the NSPE's Professional Obligations.
5. What is the NSPE's Engineer's Creed?
6. Give two examples of Engineer's Creed.

Before You Go On

Vocabulary—State the meaning of the following terms:

- Ethics ____
- Conflict of Interest ____
- Academic Dishonesty ____
- Plagiarism ____
- Contract ____