



Objectives

Aim 1: You will be able to define the difference between legal and ethical issues

Aim 2: You will be able to explain responsibilities about a legal contract in engineering

Aim 3: You will be able to discuss the ethical conduct in engineering

Aim 4: You will be able to report the major sections in a contract

In this module, we will observe the difference between legal and ethical issues. The first step is to understand the purpose of the legal system. Then, you will be familiar with the contracts. As an engineer, you should be able to prepare a contract in your professional life. I hope you never find out yourself in a situation that is related to legal issues, but in such a case, you must remember the distinctions between legal and ethical issues.

1. LEGAL ISSUES

Engineering is not only applying scientific laws and principles to technical problems. It is focused on improving a lot of society, and as such, it brings engineers into the mainstream of business and industry. Almost all entry-level engineers become involved, at least tangentially, with situations that call for some understanding of the law and situations that call for ethical judgments

Examples where an engineer might face

- Preparing a contract to secure the services of a product data management firm.
- Reviewing a contract to determine whether a contractor who built an automated production facility has satisfactorily full filled the terms of a contract.
- Deciding whether it is legal and ethical to reverse engineer a product.
- Managing a design project to avoid the possibility of a product liability suit.
- Protecting the intellectual property created as part of a new product development activity.
- Deciding whether to take a job with a direct competitor that is bidding on a contract in the area where you are now working.

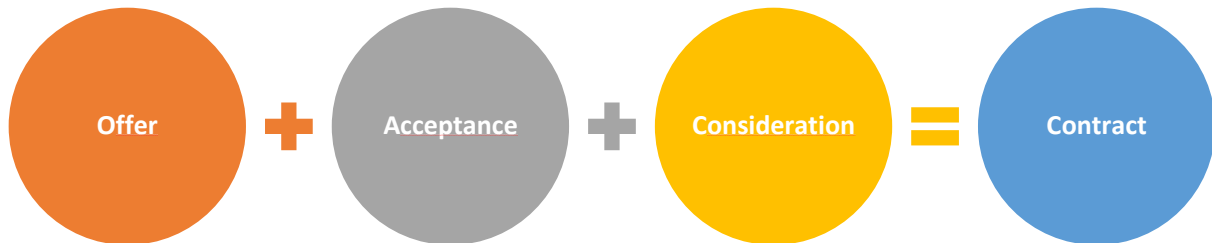
The law is a formalized code of conduct describing what society feels is the proper way to behave. In other words, laws reflect what society values. As society evolves, its attitude toward behaviour changes and the laws change as well. Also, advances in technology create new ethical issues. Ethics is the study of human conduct that lays out the moral ground rules. It is intimately related to the values of society. Thus, laws and ethics, while distinct, are not independent.

Ethical conduct is the behaviour desired by the society that is separate from the minimum standards of the law. For example, making a defective product despite taking all due care may subject you to product liability law, but it is not generally considered unethical.

The **purpose of the legal system** is to protect and make life easier for each member of society. The rule of law is important not only in criminal matters but as it affects other aspects of society like politics and the economy.

2. CONTRACTS

A contract is a promise by one person to another to do or not to do something. The only promises that the law will enforce are contracts. The three elements of a contract are:



An *offer* is an expression made by one person (the promisor) that leads another person to reasonably expect that the promisor wishes to create an agreement. The offer must be clear, definite, and specific, with no room for serious misunderstanding.

An *acceptance* of the offer is necessary to make a contract legally binding. Both the offer and acceptance must be voluntary acts. A contract cannot be forced on anyone.

A contract is not enforceable by law unless it contains an agreement to exchange promises with value, the *consideration*.

2.1. Types of Contracts

Contracts can take many forms. They may be classified as an **express** or **implied**, **bilateral** or **unilateral**. Also, a contract may be either **written** or **verbal**. Examples of contracts are purchase contracts, leases, a contract to perform a service, or an employment contract. An engineer will have to deal with contracts in several different situations. Contracts for the purchase or sale of property are common. On taking a job you may be asked to sign a contract stating that all technical ideas that you develop belong to the company, even those conceived while not on the job. In technical dealings between companies, one of the parties may be asked to sign a *confidentiality agreement*. This is a contract in which one of the parties agrees to not disclose, make use of, or copy a design or product that the other party is about to disclose.

- Introduction to the agreement. Include title and date.
- Name and address of all parties. If one of the parties is a corporation, it should be so stated.
- Complete details of the agreement.
- Promises, specifications, expected outcomes, amounts,
- timing of payments, interest.
- Include supporting documents such as technical information, drawings, specifications, and statements of any conditions on which the agreement depends.
- Time and date of the start of the work and of the expected completion.
- Terms of payment.



- Damages to be assessed in case of nonperformance. Statement of how disputes are to be arbitrated.
- Other general provisions of the agreement.
- Final legal wording. Signatures of parties, witnesses, and notary public.

2.2. Liability

Liability means being bound or obligated to pay damages or restitution. Two ways to incur liability are (1) breaking a contract or (2) committing a tort, such as fraud or negligence.

A **breach** of contract refers to violating a contract's promise. Ex: Failure to deliver detailed drawings of a new machine by the date specified in the contract is a breach of contract. It makes no difference whether this was done intentionally or not.

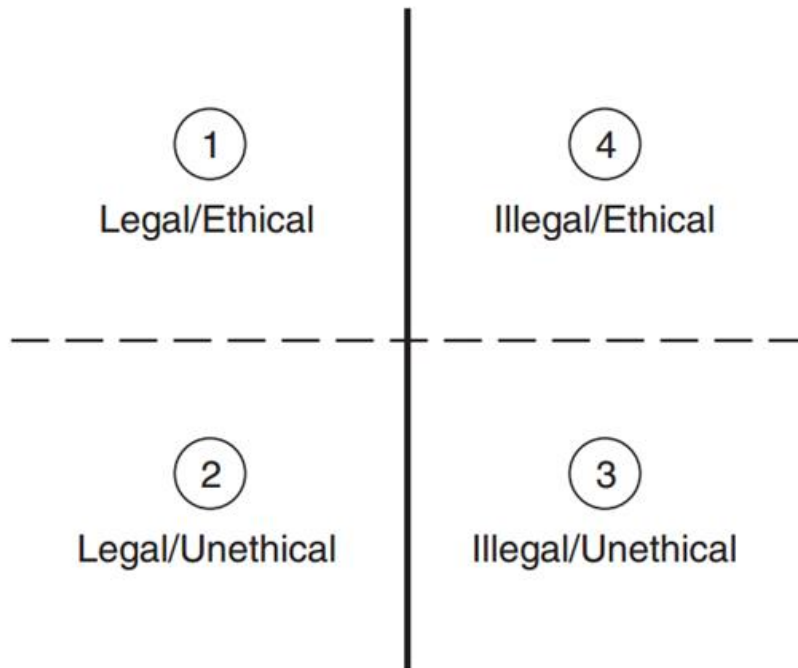
Fraud is an intentional deceitful action aimed at depriving another party of his or her rights or causing injury in some respect.

Negligence is the failure to exercise proper care and provide expertise following the standards of the profession that results in damage to property or injury to persons. This is the most common way for an engineer to incur liability to the public. For example, an engineer fails to include a major source of loading in design calculations for a public project so that the design fails. Note that being honest and well-intentioned does not absolve the engineer from a legal charge of negligence.

3. THE LEGAL AND ETHICAL DOMAINS

"Ethics is knowing the difference between what you have the right to do, and what is the right thing to do".

In this model the solid vertical line presents a clear distinction between what is legal and illegal, as set forth by statute and case law. The location of the dashed horizontal line between ethical and unethical behavior is much less well defined. The actions considered ethical depend on values, some of which are important to society, some to the profession, some to the employer, and some to the individual. The task of the ethical professional is to balance these value responsibilities. These values are clarified for the professional and business world by various codes of ethics. While you would find close agreement among engineers as to whether an action is legal or illegal, you would find much greater disagreement as to whether some act is ethical or unethical.



Quadrant 1, legal and ethical behaviour, is where you should strive to operate at all times. Most design and manufacturing activities fall within this quadrant.

Quadrant 2, legal and unethical, is the main concern of this course. The goal is to explain how to identify unethical behavior and to learn what to do about it when it occurs. There is a feeling that unethical behavior in the workplace is increasing because of increasing workplace pressures and changing societal standards. Most corporations have adopted codes of ethics. Many have established an ethics office and are offering ethics training to their personnel.

Quadrant 3, illegal and unethical, is the sector where “go-to-jail” cards are distributed. In general, most illegal acts also are unethical.

Quadrant 4, illegal and ethical, is a relatively rare event. An example could be an engineer who had signed a secrecy agreement with an employer, but then found that the employer had been engaged in producing a product that was very hazardous to the general public. Unable to get attention focused on the problem within the company, the engineer goes to the press to warn the public. The engineer has breached a contract, but in what is believed to be a highly ethical cause. Such a person would be called a whistle blower.

REFERENCES

1. H. B. Rockman, Intellectual Property Law for Engineers and Scientists, John Wiley & Sons, Hoboken, NJ, 2004.
2. S. G. Walesh, Engineering Your Future, Chap. 11, Prentice Hall, Englewood Cliffs, NJ, 1995; R. H. McCuen and J. M. Wallace, eds., Social Responsibility in Engineering and Science, Prentice Hall, Englewood Cliffs, NJ, 1987.
3. Dieter, G. E., & Schmidt, L. C. (2013). Engineering design (Vol. 3). New York: McGraw-Hill.
4. Blinn, K. W.: Legal and Ethical Concepts in Engineering, Prentice Hall, Englewood Cliffs, NJ, 1989.



5. Liuzzo, A, and J. G. Bonnice: Essentials of Business Law, 6th ed., McGraw-Hill, New York, 2007.
6. Engineering Law, Design Liability, and Professional Ethics, Professional Publication, Belmont, CA, 1983.
7. Brown, S., I. LeMay, J. Sweet, and A. Weinstein, eds.: Product Liability Handbook: Prevention, Risk, Consequence, and Forensics of Product Failure, Van Nostrand Reinhold, New York, 1990.
8. Hunziker, J. R., and T. O. Jones: Product Liability and Innovation, National Academy Press, Washington, DC, 1994.
9. Smith, C. O.: Products Liability: Are You Vulnerable? Prentice Hall, Englewood Cliffs, NJ, 1981.
10. Budinger, T. F., and M. D. Budinger, Ethics of Emerging Technology, John Wiley & Sons, Hoboken, NJ, 2006.
11. Davis, M.: Thinking Like an Engineer: Studies in the Ethics of a Profession, Oxford University Press, Oxford, 1998.
12. Harris, C. E., M. S. Pritchard, and M. Rabins: Engineering Ethics: Concepts and Cases, 3d ed., Thomson-Wadsworth Publishing Co., Belmont, CA, 2005.
13. Martin, M. W.: Ethics in Engineering, 4th ed., McGraw-Hill, New York, 2005.
14. Unger, S. H.: Controlling Technology. Ethics and the Responsible Engineer, 2d ed., John Wiley & Sons, New York, 1994.
15. Whitbeck, C.: Ethics in Engineering Practice and Research, Cambridge University Press, New York, 1998.