



Code of Ethics for Engineers

Preamble

Engineering is an important and learned profession. As members of this profession, engineers are expected to exhibit the highest standards of honesty and 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.
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.

- a. If engineers' judgment is overruled under circumstances that endanger life or property, they shall notify their employer or client and such other authority as may be appropriate.
- b. Engineers shall approve only those engineering documents that are in conformity with applicable standards.
- c. Engineers shall not reveal facts, data, or information without the prior consent of the client or employer except as authorized or required by law or this Code.
- d. Engineers shall not permit the use of their name or associate in business ventures with any person or firm that they believe is engaged in fraudulent or dishonest enterprise.
- e. Engineers shall not aid or abet the unlawful practice of engineering by a person or firm.
- f. Engineers having knowledge of any alleged violation of this Code shall report thereon to appropriate professional bodies and, when relevant, also to public authorities, and cooperate with the proper authorities in furnishing such information or assistance as may be required.

2. Engineers shall perform services only in the areas of their competence.

- a. Engineers shall undertake assignments only when qualified by education or experience in the specific technical fields involved.
- b. Engineers shall not affix their signatures to any plans or documents dealing with subject matter in which

they lack competence, nor to any plan or document not prepared under their direction and control.

- c. Engineers may accept assignments and assume responsibility for coordination of an entire project and sign and seal the engineering documents for the entire project, provided that each technical segment is signed and sealed only by the qualified engineers who prepared the segment.

3. Engineers shall issue public statements only in an objective and truthful manner.

- a. Engineers shall be objective and truthful in professional reports, statements, or testimony. They shall include all relevant and pertinent information in such reports, statements, or testimony, which should bear the date indicating when it was current.
- b. Engineers may express publicly technical opinions that are founded upon knowledge of the facts and competence in the subject matter.
- c. Engineers shall issue no statements, criticisms, or arguments on technical matters that are inspired or paid for by interested parties, unless they have prefaced their comments by explicitly identifying the interested parties on whose behalf they are speaking, and by revealing the existence of any interest the engineers may have in the matters.

4. Engineers shall act for each employer or client as faithful agents or trustees.

- a. Engineers shall disclose all known or potential conflicts of interest that could influence or appear to influence their judgment or the quality of their services.
- b. Engineers shall not accept compensation, financial or otherwise, from more than one party for services on the same project, or for services pertaining to the same project, unless the circumstances are fully disclosed and agreed to by all interested parties.
- c. Engineers shall not solicit or accept financial or other valuable consideration, directly or indirectly, from outside agents in connection with the work for which they are responsible.
- d. Engineers in public service as members, advisors, or employees of a governmental or quasi-governmental body or department shall not participate in decisions with respect to services solicited or provided by them or their organizations in private or public engineering practice.
- e. Engineers shall not solicit or accept a contract from a governmental body on which a principal or officer of their organization serves as a member.

5. Engineers shall avoid deceptive acts.

- a. Engineers shall not falsify their qualifications or permit misrepresentation of their or their associates' qualifications. They shall not misrepresent or exaggerate their responsibility in or for the subject matter of prior assignments. Brochures or other presentations incident

to the solicitation of employment shall not misrepresent pertinent facts concerning employers, employees, associates, joint venturers, or past accomplishments.

- b. Engineers shall not offer, give, solicit, or receive, either directly or indirectly, any contribution to influence the award of a contract by public authority, or which may be reasonably construed by the public as having the effect or intent of influencing the awarding of a contract. They shall not offer any gift or other valuable consideration in order to secure work. They shall not pay a commission, percentage, or brokerage fee in order to secure work, except to a bona fide employee or bona fide established commercial or marketing agencies retained by them.

III. Professional Obligations

1. Engineers shall be guided in all their relations by the highest standards of honesty and integrity.

- a. Engineers shall acknowledge their errors and shall not distort or alter the facts.
- b. Engineers shall advise their clients or employers when they believe a project will not be successful.
- c. Engineers shall not accept outside employment to the detriment of their regular work or interest. Before accepting any outside engineering employment, they will notify their employers.
- d. Engineers shall not attempt to attract an engineer from another employer by false or misleading pretenses.
- e. Engineers shall not promote their own interest at the expense of the dignity and integrity of the profession.
- f. Engineers shall treat all persons with dignity, respect, fairness, and without discrimination.

2. Engineers shall at all times strive to serve the public interest.

- a. Engineers are encouraged to participate in civic affairs; career guidance for youths; and work for the advancement of the safety, health, and well-being of their community.
- b. Engineers shall not complete, sign, or seal plans and/or specifications that are not in conformity with applicable engineering standards. If the client or employer insists on such unprofessional conduct, they shall notify the proper authorities and withdraw from further service on the project.
- c. Engineers are encouraged to extend public knowledge and appreciation of engineering and its achievements.
- d. Engineers are encouraged to adhere to the principles of sustainable development¹ in order to protect the environment for future generations.
- e. Engineers shall continue their professional development throughout their careers and should keep current in their specialty fields by engaging in professional practice, participating in continuing education courses, reading in the technical literature, and attending professional meetings and seminar.

3. Engineers shall avoid all conduct or practice that deceives the public.

- a. Engineers shall avoid the use of statements containing a material misrepresentation of fact or omitting a material fact.
- b. Consistent with the foregoing, engineers may advertise for recruitment of personnel.
- c. Consistent with the foregoing, engineers may prepare articles for the lay or technical press, but such articles shall not imply credit to the author for work performed by others.

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.

- a. Engineers shall not, without the consent of all interested parties, promote or arrange for new employment or practice in connection with a specific project for which the engineer has gained particular and specialized knowledge.
- b. Engineers shall not, without the consent of all interested parties, participate in or represent an adversary interest in connection with a specific project or proceeding in which the engineer has gained particular specialized knowledge on behalf of a former client or employer.

5. Engineers shall not be influenced in their professional duties by conflicting interests.

- a. Engineers shall not accept financial or other considerations, including free engineering designs, from material or equipment suppliers for specifying their product.
- b. Engineers shall not accept commissions or allowances, directly or indirectly, from contractors or other parties dealing with clients or employers of the engineer in connection with work for which the engineer is responsible.

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.

- a. Engineers shall not request, propose, or accept a commission on a contingent basis under circumstances in which their judgment may be compromised.
- b. Engineers in salaried positions shall accept part-time engineering work only to the extent consistent with policies of the employer and in accordance with ethical considerations.
- c. Engineers shall not, without consent, use equipment, supplies, laboratory, or office facilities of an employer to carry on outside private practice.

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.

- a. Engineers in private practice shall not review the work of another engineer for the same client, except with the knowledge of such engineer, or unless the connection of such engineer with the work has been terminated.
- b. Engineers in governmental, industrial, or educational employ are entitled to review and evaluate the work of other engineers when so required by their employment duties.
- c. Engineers in sales or industrial employ are entitled to make engineering comparisons of represented products with products of other suppliers.

8. Engineers shall accept personal responsibility for their professional activities, provided, however, that engineers may seek indemnification for services arising out of their practice for other than gross negligence, where the engineer's interests cannot otherwise be protected.

- a. Engineers shall conform with state registration laws in the practice of engineering.
- b. Engineers shall not use association with a nonengineer, a corporation, or partnership as a "cloak" for unethical acts.

9. Engineers shall give credit for engineering work to those to whom credit is due, and will recognize the proprietary interests of others.

- a. Engineers shall, whenever possible, name the person or persons who may be individually responsible for designs, inventions, writings, or other accomplishments.
- b. Engineers using designs supplied by a client recognize that the designs remain the property of the client and may not be duplicated by the engineer for others without express permission.
- c. Engineers, before undertaking work for others in connection with which the engineer may make improvements, plans, designs, inventions, or other records that may justify copyrights or patents, should enter into a positive agreement regarding ownership.
- d. Engineers' designs, data, records, and notes referring exclusively to an employer's work are the employer's property. The employer should indemnify the engineer for use of the information for any purpose other than the original purpose.

Footnote 1 "Sustainable development" is the challenge of meeting human needs for natural resources, industrial products, energy, food, transportation, shelter, and effective waste management while conserving and protecting environmental quality and the natural resource base essential for future development.

"By order of the United States District Court for the District of Columbia, former Section 11(c) of the NSPE Code of Ethics prohibiting competitive bidding, and all policy statements, opinions, rulings or other guidelines interpreting its scope, have been rescinded as unlawfully interfering with the legal right of engineers, protected under the antitrust laws, to provide price information to prospective clients; accordingly, nothing contained in the NSPE Code of Ethics, policy statements, opinions, rulings or other guidelines prohibits the submission of price quotations or competitive bids for engineering services at any time or in any amount."

Statement by NSPE Executive Committee

In order to correct misunderstandings which have been indicated in some instances since the issuance of the Supreme Court decision and the entry of the Final Judgment, it is noted that in its decision of April 25, 1978, the Supreme Court of the United States declared: "The Sherman Act does not require competitive bidding."

It is further noted that as made clear in the Supreme Court decision:

1. Engineers and firms may individually refuse to bid for engineering services.
2. Clients are not required to seek bids for engineering services.
3. Federal, state, and local laws governing procedures to procure engineering services are not affected, and remain in full force and effect.
4. State societies and local chapters are free to actively and aggressively seek legislation for professional selection and negotiation procedures by public agencies.
5. State registration board rules of professional conduct, including rules prohibiting competitive bidding for engineering services, are not affected and remain in full force and effect. State registration boards with authority to adopt rules of professional conduct may adopt rules governing procedures to obtain engineering services.
6. As noted by the Supreme Court, "nothing in the judgment prevents NSPE and its members from attempting to influence governmental action . . ."

Note: In regard to the question of application of the Code to corporations vis-a-vis real persons, business form or type should not negate nor influence conformance of individuals to the Code. The Code deals with professional services, which services must be performed by real persons. Real persons in turn establish and implement policies within business structures. The Code is clearly written to apply to the Engineer, and it is incumbent on members of NSPE to endeavor to live up to its provisions. This applies to all pertinent sections of the Code.



GEEM 433

A Practical Ethics Toolkit

Ethical Approaches

**ENGINEERING ETHICS AND MORALE
PHILOSOPHY**

3 Ethical Approaches –

1. Utilitarian Approach

- a) Cost-benefit Test**
- b) Test of Maximizing Goods**
- c) Applying the Rules and Practices Test**

2. The Respect for Persons Approach

- a) The Golden Rule Test**
- b) The Self-Defeating Test**
- c) The Rights Test**

3. The Virtue Ethics Approach

Utilitarian Approach

The fundamental principle of the utilitarian model of common morality is *We should maximize overall well-being. We refer to the population over which well-being is maximized as the audience.*

- To implement the utilitarian approach, we must determine the scope of this audience.
- Once we determine the audience, we must know which course of action will produce the most good in both the short and the long term.

Audience:

Ideally, perhaps the audience should include all humans, or at least all humans who might be affected by the action to be evaluated.

Some utilitarians think even those animals clearly able to experience pain or pleasure should be included in the audience, if they would also be affected.

But then it becomes enormously difficult to calculate which actions produce the most good for so large an audience.

If we limit the audience so that it includes only our country, company, or community, then we face the criticism that others have been arbitrarily excluded.

Therefore, in practice, those with utilitarian sympathies need to develop acceptable ways of limiting the audience

Cost Benefit Test of Utilitarian Approach

If a utilitarian approach requires that we maximize well-being, how should we go about determining the criteria we should use in seeking this maximization?

One approach that has appeal from the engineering perspective is cost-benefit analysis (CBA), which holds that the course of action that produces the greatest benefit or utility relative to cost should be chosen.

In using this method, one must convert negative and positive utilities into monetary terms. A close relative of CBA is risk-benefit analysis (RBA), which attempts to balance the risk of benefit against the risk of harm. Because it is often more difficult to determine risks than costs, we shall consider only CBA, which involves three steps. Let's look at them.

Applying Cost Benefit Test of Utilitarian Approach

Three (03) Steps:

1. Identify the available options that can provide a solution to the problem under consideration.
2. Assess the costs (measured in monetary terms) and the benefits (also measured in monetary terms) of each option. The costs and benefits must be assessed for the entire audience of the action, or all who are affected by the decision.
3. Make the decision that is likely to result in the greatest benefit relative to cost; that is, the course of action chosen must not be one for which the funds spent on implementing the action could be spent on another action that would better resolve the problem under consideration.

Test of Maximizing Good Consequences

Some utilitarian approaches do not require that values be measured in strictly quantitative terms. However, they do require that we try to determine what will, in some sense, maximize good consequences. Here, we can try to proceed on the assumption that an action is right if it results in more utility than any alternative action that is available in this situation.

In other words, the question is, Will this particular course of action result in more good than any alternative course of action that is available in this situation?

To answer this question, the following procedure is useful.

Applying Test of Maximizing Goods Consequences

1. Identify the available options in this situation.
2. Determine the appropriate audience for the options, keeping in mind the problems in determining the audience.
3. Decide which available option is likely to bring about the greatest good for the appropriate audience, taking into account the harms as well as benefits.

The Rules and Practices Test

It is one thing to ask about the utility of the consequences of a single action, and another thing entirely to ask about the utility of the consequences of a general practice, as this practice is enshrined in a rule or set of rules.

Determining the consequences of a general practice may be more difficult than determining the consequences of a single act, because the number of people affected by a general practice the audience is usually much larger. However, sometimes the consequences of a general practice are so obvious that little imagination is needed to know what the consequences of the policy would be.

The Rules and Practices Test

Think of traffic rules designed to enhance cooperative, safe driving. It is late at night and there seems to be no one around, and the light is red. You might think it is obvious that no one would be harmed and it would be more convenient to you to violate the law and go through the red light.

From a utilitarian perspective, in situations covered by well-understood, generally observed rules or practices that serve utilitarian ends, a case can be made for justifying your actions by appealing directly to these rules and practices. These generally observed rules and practices, in turn, are justified by their utility. In the vast majority of cases, you should probably just abide by the general rules and not even consider whether their violation in a particular case should be justified.

Applying The Rules and Practices Test

1. Identify the established practice, if any, that applies to the appropriate audience in this situation. If the practice promotes utility better than any alternative practice, it should be followed.
2. If there is no applicable practice, select the one whose support in this situation is likely to have the best long-run consequences, all things considered.
3. Follow the justified practice in this situation, unless you think this might be a situation in which exception can justifiably be made on utilitarian grounds



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PHILOSOPHY**

Welcome!
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Respect for Persons Test

The fundamental principle of the RP model of common morality is “to Act so that you respect all humans as free and equal moral agents”. This equal regard for moral agents can be understood as a basic requirement of justice.

- A moral agent must be distinguished from knives or airplanes, which can only fulfill goals or purposes that are imposed upon them from the outside. Inanimate objects cannot evaluate actions from a moral standpoint.
- A paradigm example of a moral agent is a normal adult human being who, in contrast to inanimate objects, can formulate goals or purposes of his or her own. Such a being is said to have autonomy.
- From the RP standpoint, maximizing the welfare of the majority, as utilitarianism suggests, must take second place to the goal of respecting the moral agency of all individuals. People may not be killed, deceived, denied their freedom, or otherwise violated simply to bring about a greater total amount of utility. As with our treatment of utilitarian thinking, we consider three approaches to RP thinking.

The Golden Rule Test

Reversibility is a special application of the Universalization Principle because the idea of universalization implies that a judgment should not change simply because the roles are reversed.

In thinking about treating others as I would have them treat me, I need to ask what I would think if I were in their position. If I am tempted to tell a lie to escape a particular difficulty, then I need to ask what I would think if the lie were told to me. Universalizing our thinking by applying the idea of reversibility can help us realize that we may be endorsing treating others in ways that we would object to if done to us.

This is the basic idea behind the Golden Rule, Its most familiar formulation in our culture *is* ***“Do unto others as you would have them do unto you”***.

Applying the Golden Rule Test

1. Identify the action that is to be tested by applying the Golden Rule.
2. Ask whether you would be willing to have a similar action done when you are the recipient of the action, assuming that your values and those of others are similar.
3. If you are willing to be the recipient of your contemplated action, the action is morally permissible by the Golden Rule

The Golden Rule does not by itself provide all the criteria that must be met to satisfy the RP standard, but its requirements of universalizability and reversibility are vital steps in satisfying that standard.

The Self-Defeating Test

It is important to realize that using the self-defeating test does not depend on whether anyone actually makes promises without intending to keep them, cheats on exams, or substitutes inferior and cheaper parts in a product.

The question is, What if everyone did this? This is a hypothetical question, not a prediction that others actually will act this way as a result of what someone else does.

Another way of applying the fundamental idea of the Universalization Principle is to ask whether I would be able to perform the action in question if everyone else performed the same action in the same or similar circumstances.

- If everyone else did what I am doing, would this undermine my ability to do the same thing?
- If I must say yes to this question, then I cannot approve others doing the same kind of thing that I have done, and thus universalizing my action would be self-defeating.

To proceed anyway, treating myself as an exception to the rule is to pursue my own good at the expense of others. Thus, it fails to treat them with appropriate respect.

Applying the Self-Defeating Test

1. Identify the action you want to test by the Self-Defeating Test.
2. Ask whether the action would be self-defeating if everyone did it, either because
 - (a) the action could not be performed if everyone did it, or
 - (b) the purpose you have in performing the action would be undermined if everyone did it.
1. If the action fails either (a) or (b), it is impermissible. If not, it is permissible.

The Rights Test

Some theorists in the RP tradition have concluded that one of the most useful ways of formulating the requirement to respect the moral agency of others is to say that we should honor the rights of people that are necessary for them to exercise their moral agency and to pursue their well-being.

A right may be understood as both an entitlement to act and an entitlement to have another individual act in a certain way. Because of this dual aspect, rights are often thought of as existing in a correlative relationship with duties.

Thus, if Kelly has a right to life, others have a duty not to kill Kelly. If Kelly has a right to bodily integrity, others have a duty not to cause bodily harm to Kelly.

Gewirth's Hierarchy of Rights

Tier 1. The most basic rights, the essential preconditions of action: for example, life, physical integrity, and mental health.

Tier 2. Rights to maintain the level of purpose fulfillment one already has, such as the right not to be deceived or cheated, the right to informed consent to unusual risks, the right not to have possessions stolen, the right not to be defamed, and the right not to suffer broken promises.

Tier 3. The rights necessary to increase one's level of purpose fulfillment: for example, the right to attempt to acquire property and wealth



Applying the Rights Test

1. Identify the action or rule to be to be evaluated and the available options.
2. Determine what options are available and what rights are at stake in each of the options.
3. Determine the place in the hierarchy of rights at stake and whether the rights are violated or infringed.
4. Identify the action or rule that will produce the least serious violations or infringements of the most significant rights.
5. Make a choice that seems likely to produce the least serious rights infringements or violations, all things considered.

Applying the Rights Test

Using this hierarchy, it would be wrong for a plant manager to attempt to save money by emitting a pollutant that is highly carcinogenic, because the right to life is a first-tier right and the right to acquire and use property and wealth for one's benefit is a third-tier right.

Sometimes, however, the hierarchy is more difficult to apply. How shall we balance a slight infringement of a first-tier right against a much more serious infringement or outright violation of a second-tier or third-tier right?

The hierarchy of rights provides no automatic answer to such questions. Nevertheless, it provides a framework for addressing them

Virtue Ethics

Virtue ethics, perhaps the oldest tradition of ethical thought, has become increasingly important among contemporary ethicists. The fundamental principle of virtue ethics is Act in the way the good or virtuous person would act in the circumstances.

A virtue is usually described as a dispositional trait, that is, a character trait that disposes or inclines a person to do the right thing. A virtue can be described as both deep and wide. It is deep in the sense that a virtue is a firmly entrenched habit that leads a person to consistently act in a certain way and to which he is strongly committed. It is wide in that it manifests itself in a variety of ways. A virtuous person exhibits virtue not only in actions but also in emotional reactions, in interests, and in general sensibilities. A truly honest person is not honest simply because she thinks it is the best way to stay out of trouble, but because she genuinely believes that being honest is the best way to live. She is disgusted by people who are dishonest and does not enjoy being in their company

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Virtue Ethics

In order to better understand what a virtue is, virtue ethicists such as Aristotle have found it useful to think of virtues as occupying a middle position (or mean) between vices. We can think of courage as a middle ground between the vice of cowardice on the one hand and the vice of foolhardiness on the other. We can think of the virtue of generosity as a middle ground between the vice of miserliness on the one hand and the vice of being a spendthrift on the other. We can think of the virtue of loyalty to an employer as a middle ground between the vice of complete disloyalty on the one hand and the vice of unquestioning obedience to the employer on the other.¹¹



Core Virtue & Selected Character Strengths

1. Wisdom (creativity, open-mindedness, perspective)
2. Courage (bravery, persistence, vigor or energy)
3. Humanity (love, kindness)
4. Justice (citizenship, fairness, leadership)
5. Temperance (modesty, self-control)
6. Transcendence (appreciation of beauty and excellence, gratitude, spirituality)

Applying the Virtue Ethics

1. Determine the alternative courses of action that are possible in the situation.
2. Determine the virtues (or vices) that correspond to these courses of action.
3. Evaluate the actions in terms of the virtues (or vices) that motivate them.
 1. If a course of action is motivated by vices, a course of action motivated by virtues should be chosen instead.
 2. If two or more courses of action are motivated by different virtues, the course of action motivated by the most appropriate virtues for the situation should be chosen.
4. If no decision can be made as to which virtues are most appropriate, the actions associated with different virtues are equally permissible.

Professional Care

Engineers recognize the importance of this virtue, because they often refer to taking due care as important for members of their profession.

- Care is a disposition to both protect and promote the well-being of another in the case of engineering, the wellbeing of the public.
- The paradigm of care is the relationship of parents to their children. **The care relationship to children has two dimensions:** protecting children from harm, and promoting their well-being.
- In manifesting the virtue of care for the public, these same dimensions are important. Engineers must insure that they not only do not harm the health, safety, and welfare of the public (**prohibitive and preventive ethics**), but also promote the well-being of the public through their professional work (**aspirational ethics**).
- As an optional further extension of aspirational ethics, engineers may devote themselves to improving the well-being of the poor and disadvantaged.

Virtue Ethics: An Application

Because applying virtue ethics may cause special difficulties, we supply an example of how these guidelines apply to a moral issue.

“After completing his degree in chemical engineering in June, Gerald is scheduled to return to the family farm to help with its operation. In early May, his father became seriously ill, and Gerald is convinced that the only way to save the family farm is to take a job in engineering. Most of his fellow seniors have already taken jobs, and the interviewing season is over. The only employment opportunity Gerald finds is with Pro-Growth Pesticides. The family farm is an organic farm, however, and Gerald's father has always strongly opposed the use of pesticides. Gerald himself has become convinced that pesticides harm the environment generally and farm products in particular. He knows that he will be asked about his views on pesticides.”

What should he do? Let us look at the issue from the standpoint of virtue ethics.

Virtue Ethics: An Application

- 1. Gerald must first determine the alternative actions that are possible in the situation. He thinks of three possibilities. He could:**
 - (a) refuse to interview for the job,
 - (b) interview but answer questions about pesticides honestly, or
 - (c) interview and misrepresent his views on pesticides in order to get the job.

Virtue Ethics: An Application

2. In determining the virtues and vices that correspond to these courses of action, Gerald might come up with the following analysis.

(a) If he refuses to interview for the job, he will continue to be an honest person and also maintain his integrity. That is, he will continue to be a person who acts consistently with his principles. He may, however, not manifest proper loyalty to his family members, because he would fail to help them keep the farm. He would show loyalty to the family ideals, however.

(b) If he interviews for the job but answers questions about his views on pesticides honestly, he will preserve his honesty, but may compromise his integrity by applying for (and possibly getting) a job that would be inconsistent with his principles. He will preserve his loyalty to his family, however, at least in the sense of helping to keep the farm.

(c) If he interviews for the job and misrepresents his views on pesticides, he will manifest loyalty to his family, but fail to be honest or a person of integrity.

Virtue Ethics: An Application

3. Now we must evaluate the alternatives open to Gerald in terms of whether they are grounded, either directly or indirectly, in the virtues appropriate to a morally worthy person.

How should he evaluate these three options? He will fail to properly manifest at least one of the virtues he prizes no matter what he does.

- Options (a) and (b) will violate only one of the virtues, while (c) will violate two.
 - Option (c), furthermore, seems to more directly manifest the vices of dishonesty and lack of integrity.
- While (c) seems to be the least desirable choice, the choice between (a) and (b) is more difficult.
 - If he can find another job opportunity, clearly option (a) is the most desirable.
 - If this possibility is not open to him, it may depend upon what kind of person Gerald most wants to be: a loyal person or a person with integrity.

Virtue Ethics: An Application

3.

Gerald may well decide that he wants to manifest integrity by being consistent with his own values even more than he wants to be loyal to his family, so that he should refuse the interview.

Gerald may be able to find a creative middle way, so that such a difficult choice will not have to be made.



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Syllabus

Standards and codes:

- Fundamental Canons, NSPE codes, IEEE codes of conduct, ACM codes;
- Institutionalization of ethical conduct.
- Ethical Dilemmas, Choices (Whistle Blowing),

Computer Ethics:

- Computer Crime and Cyber Security,
- Privacy and Confidentiality issue in CSE,
- Legal Framework in CSE-Copyright laws, ICT Act,
- Right To Information (RTI), Patents, and Royalty etc.
- Ethical Challenges for CSE Engineers with the advancement of Technology;

Syllabus

Case studies:

- related to ethical issues in ICT and other Engineering disciplines.

Introduction to Philosophy of Engineering:

- metaphysics,
- epistemology,
- axiology, and logic.

Conflicts of Interest

Philosopher Michael Davis provides a very useful analysis of conflicts of interest.

Using a modified version of Davis' definition, we shall say that a conflict of interest exists for a professional when, acting in a professional role, **he or she has interests that tend to make a professional's judgment less likely to benefit the customer or client than the customer or client is justified in expecting.**

Now consider this case.

John is employed as a design engineer at a small company that uses valves. In recommending product designs for his company's clients, he usually specifies valves made by a relative, even when valves made by other companies might be more appropriate. Should his company's clients discover this, they might well complain that John is involved in a conflict of interest. What does this mean?

Conflicts of Interest

In this example,

- John has allowed his interest in maintaining a good relationship with his relative to unduly influence his professional judgment.
- He has betrayed the trust that his clients have placed in his professional judgment by serving his personal interest in his relative rather than the interests of his clients as he is paid to do

Conflicts of interest can strike at the heart of professionalism.

- This is because professionals are paid for their expertise and unbiased professional judgment in pursuing their professional duties and conflicts of interest threaten to undermine the trust that clients, employers, and the public place in that expertise or judgment.
- When a conflict of interest is present, there is an inherent conflict between a professional actively pursuing certain interests and carrying out his or her professional duties as one should.

Conflicts of Interest - Definition

What is a conflict of interest?

- A conflict between an obligation to exercise good judgment and interest(s) that may compromise that judgment.

Potential conflict of interest:

- A situation in which if one does x, there will be an actual conflict of interest.

Appearance of a conflict of interest:

- A situation in which others might think that there is a conflict of interest, even if there isn't really one.

Avoiding conflicts of interest: Most engineering codes of ethics require the avoidance of conflicts of interest or even the appearance of conflicts of interest, insofar as this is possible.

Code of Ethics & Conflicts of Interest

Engineering codes of ethics usually have something to say about conflicts of interest.

Fundamental Canon 4 of the NSPE code addresses the idea that engineers should act as faithful agents or trustees in performing their professional duties.

The first entry under the heading is that engineers should disclose all known or potential conflicts of interest to their employers or clients.

Section III on professional obligations specifies some specific prohibitions:

5. Engineers shall not be influenced in their professional duties by conflicting interests.

- a. Engineers shall not accept financial or other considerations, including free engineering designs, from material suppliers for specifying their product.
- b. Engineers shall not accept commissions or allowances, directly or indirectly, from contractors or other parties dealing with clients or employers for the Engineer in connection with work for which the Engineer is responsible.

What is Whistleblowing?

- The origin and exact meaning of the metaphor of whistleblowing are uncertain.
- **According to Michael Davis, there are three possible sources of the metaphor:**
 - a train sounding a whistle to warn people to get off the track,
 - a referee blowing a whistle to indicate a foul, or
 - a police officer blowing a whistle to stop wrongdoing. One problem with all of these metaphors,

Davis points out, is that they depict whistleblowers as outsiders, whereas typically a whistleblower is more like a team player who calls a foul play on his own team.

- **This suggests two characteristics of whistleblowing:** (1) One reveals information that the organization does not want to be shared with the public or some authority; and (2) one does this outside of approved channels in the organization.
- A whistleblower is usually defined as a person who is an insider, one who is a part of the organization. For this reason, the question of loyalty arises.

—— Whistleblowing & Loyalty

When considering whistleblowing, the question of company loyalty needs to be considered because a whistleblower is an individual who is part of the company. The individual will release information outside of company channels. Generally, the whistleblower will reveal information that the organization doesn't want public.

Whistleblowing & Loyalty – Harm Preventing Justifications

Richard DeGeorge has provided a set of criteria that he contends must be satisfied before whistleblowing can be morally justified. DeGeorge believes that whistleblowing is morally permissible provided that

1. the harm that will be done by the product to the public is serious and considerable ;
2. the employees report their concern to their immediate superiors; and
3. getting no satisfaction from their immediate superiors, they exhaust the channels available within the organization.

DeGeorge believes that whistleblowing is morally obligatory provided that

- 1. the employee has documented evidence that would convince a responsible, impartial observer that his view of the situation is correct and the company policy is wrong ; and
- 2. the employee has strong evidence that making the information public will in fact prevent the threatened serious harm.

Within the DeGeorge model, we note the potential harm to the public. This is what initiates the consideration that whistleblowing might be justified. The public will benefit if these harms are eliminated.

Cyber Crime

- **Cybercrime** encompasses a wide range of criminal activities that are carried out using digital devices and/or networks. These crimes involve the use of technology to commit fraud, identity theft, data breaches, computer viruses, scams, and expanded upon in other malicious acts.
- Cybercriminals exploit vulnerabilities in computer systems and networks to gain unauthorized access, steal sensitive information, disrupt services, and cause financial or reputational harm to individuals, organizations, and governments.

Cyber Crime

- When an individual is the target of cybercrime, the computer is often the tool rather than the target. These crimes, which typically exploit human weaknesses, usually do not require much technical expertise.
- These are the types of crimes which have existed for centuries in the offline world. Criminals have simply been given a tool that increases their pool of potential victims and makes them all the harder to trace and apprehend.
- On 13 September 2023, Bangladesh's national parliament approved the Cyber Security Act (CSA) to provide the country with a strong legal framework for ensuring protection from cyber- crimes.

Cyber Crime

Crimes that use computer networks or devices to advance other ends include:

- Fraud and identity theft (although this increasingly uses malware, hacking or phishing, making it an example of "computer as target" as well as "computer as tool")
- Information warfare
- Phishing scams
- Spam
- Propagation of illegal, obscene, or offensive content, including harassment and threats
- The unsolicited sending of bulk email for commercial purposes (spam) is unlawful in some jurisdictions.
- Phishing is mostly propagated via email. Phishing emails may contain links to other websites that are affected by malware. Or they may contain links to fake online banking or other websites used to steal private account information.

Copywrite

- A **copyright** is a type of intellectual property that gives its owner the exclusive legal right to copy, distribute, adapt, display, and perform a creative work, usually for a limited time.
- The creative work may be in a literary, artistic, educational, or musical form.
- Copyright is intended to protect the original expression of an idea in the form of a creative work, but not the idea itself.

Copyright Law

- The term “Copyright” means right to copy. It is a legal term enacted by the legislators of the state. It provides exclusive right to the creators of the creative works for limited time. The copyright empowers the authors or creators to keep control over their own creations in their life and their heirs for a limited time. This allows them to get payments for any reproduction of their works in that limited time.
- The purpose of giving authors or creators such monopoly is to encourage the creative works. U.S. constitution describes this purpose in Article I, Section 8, as to “promote the progress of science and useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.” (J. Murrey Atkins Library, n.d.). However, they can sell their copyright to others or grant permission someone else to use their works in return of payment or not. The copyright law also provides some exceptions which allow others to use copyright protected works without permission.

Key Points to Copyright

Key Points on Copyright

- Copyright law protects creators of original works.
- The original works, which are tangible form or fixed, are protected by copyright laws.
- Duration of copyright varies from country to country. The works are protected by the Bangladesh Copyright Act until sixty years after the death of creators.
- Most other features are almost similar in the countries which signed Berne Convention.
- The copyright law contains a number of provisions for use of protected works without seeking permission from the copyright owners.



GEEM 433

A Practical Ethics Toolkit

**ENGINEERING ETHICS AND MORALE
PHILOSOPHY**

What is Philosophy?

Philosophy is an ancient discipline, which probably began as early as human civilization, that sought knowledge of all things on earth and in heaven. Knowledge of natural things and their causes lead to the creation of physics and metaphysics. Knowledge of human affairs and their constitutive relations lead to the creation of ethics, politics, and the philosophy of history.

Knowledge of heavenly things leads to cosmology and speculative theology.

Philosophy in the ancient world was the parent of most scientific disciplines.

Philosophy

In order to understand philosophy you must not only grasp its subject matter, such as metaphysics and ethics, but also its method. In western philosophy the method to obtain knowledge is rooted in the philosopher's ability to form and evaluate arguments.

In Asian philosophy there is greater emphasis on knowledge of the Way (Dao) to live a life harmonizing the individual with her natural and social world. But in all cultures philosophy requires that we think critically: to be clear, precise, well-organized, truthful, complete, and able to handle objections. The study of critical thinking is called logic.

To be philosophical is to be a logical thinker who seeks knowledge of the whole. In this way philosophers avoid unsupported beliefs but base their views on good reason and evidence. Philosophers demand of themselves and others that they have reasoned logical belief.

—— Philosophy of Engineering

The philosophy of engineering is an emerging discipline that considers what engineering is, what engineers do, and how their work affects society, and thus includes aspects of ethics and aesthetics, as well as ontology, epistemology, etc

5 Concepts of Engineering Philosophy:

- Metaphysics
- Epistemology
- Ethics
- Logic
- Axiology

Metaphysics

At its core the study of metaphysics is the study of the nature of reality, of what exists in the world, what it is like, and how it is ordered. In metaphysics philosophers wrestle with such questions as:

- Is there a God?
- What is truth?
- What is a person? What makes a person the same through time?
- Is the world strictly composed of matter?
- Do people have minds? If so, how is the mind related to the body?
- Do people have free will?
- What is it for one event to cause another?

Epistemology

Epistemology is the study of knowledge. It is primarily concerned with what we can know about the world and how we can know it. Typical questions of concern in epistemology are:

- What is knowledge?
- Do we know anything at all?
- How do we know what we know?
- Can we be justified in claiming to know certain things?

Ethics

The study of ethics often concerns what we ought to do and what it would be best to do. In struggling with this issue, larger questions about what is good and right arise. So, the ethicist attempts to answer such questions as:

- What is good? What makes actions or people good?
- What is right? What makes actions right?
- Is morality objective or subjective?
- How should I treat others?

Logic

Another important aspect of the study of philosophy is the arguments or reasons given for people's answers to these questions. To this end philosophers employ logic to study the nature and structure of arguments. Logicians ask such questions as:

- What constitutes "good" or "bad" reasoning?
- How do we determine whether a given piece of reasoning is good or bad?

Axiology

Axiology is the branch of practical philosophy which studies the nature of value.

Axiologists study value in general rather than moral values in particular and frequently emphasize the plurality and heterogeneity of values while at the same time adopting different forms of realism about values.

- Axiology can be identified as the ultimate study of different materials with different values.
- The study tries to summarize different materials with value, nature, and characteristics.
- It also involves the study of principles and is divided into two major classifications, including ethics and aesthetics.

Axiology is one of the main issues in philosophy. There are two parts to axiology: ethics and aesthetics. The concept of axiology delves into the essence of value and the metaphysical aspects. The theory works on comprehending nature and arguing about what is actually valued. The conceptualization directly involves the objectives of the research.

Ethical Dilemmas

An ethical dilemma is a type of ethical issue that arises when the available choices and obligations in a specific situation do not allow for an ethical outcome. In such instances, a choice or an action is required and all of the available alternatives violate an explicit ethical principle or guideline.

An ethical dilemma is a paradox that comes up when there are two or more options, but neither of them is the best ethical or moral option. False accounting, sexual harassment, data privacy, nepotism, discrimination—are just some of the ethical dilemmas that happen in today's workplace.

- Engineers will likely have to deal with engineering ethical dilemmas as they develop new technology, engineering processes, and products. Though engineers may not always be directly responsible for these decisions, they still have a responsibility to do what's best for the public.
- They also have a responsibility to disclose their engineering decisions and explain why their choice was necessary or helpful. This is vital in engineering practice where there are often multiple choices that can all lead to negative consequences.

Ethical Dilemmas - Examples

#1 An ethical dilemma faced by the engineers designing an aircraft: lowering safety standards by designing an aircraft with less structural strength to make it easier to manufacture, or engineering an aircraft with engineering standards that will have high safety standards but make it more expensive and time-consuming to make.

#2 Ethical Dilemma faced by engineering design team developing a new car: engineering an aesthetically pleasing design with one-time convenience features that many consumers want but adding to the environmental costs of manufacturing, or engineering a product whose look is not as pleasing for most consumers but will have less impact on the environment.

Ethical Dilemmas

What are some of the ethical issues in computer science and technology?

- Use of artificial intelligence.
- Negative environmental impact.
- Misuse of personal and sensitive data.
- 'Deep fakes' and misinformation.
- Use of autonomous technology.