# Summary Chapter 1

## Engineering Ethics Making a Difference

- Engineering ethics is a type of professional ethics and as such must be distinguished from personal ethics and from the ethical obligations that one may have as an occupant of other social roles.
- Engineering ethics is concerned with the question of what the standards in engineering ethics should be and how to apply these standards to particular situations.
- One value in studying engineering ethics is that it can help promote responsible engineering practice.
- A significant part of responsible engineering practice is the exercise of preventive ethics: the practice of sound ethical decision making to avoid more serious problems later.

# Summary Chapter 2

## Responsibility in Engineering

- Three concepts of responsibility seem to be important in assessing engineering professionalism. *Obligation responsibility* refers to the positive obligations of engineers to observe professional standards and even go beyond them. *Blame-responsibility* refers to the responsibility for harmful action. *Role responsibility* refers to being in a role with certain responsibilities so that one has obligation responsibilities and can also be blamed for harm.
- Obligation responsibility requires that one exercise reasonable care in one's professional work. Engineers need to be concerned with complying with the law, adhering to standard norms and practices, and avoiding wrongful behavior.

# Summary Chapter 2

## Responsibility in Engineering

- Good works reminds us that one's work is never done, especially in engineering where safety, health and welfare of others is so clearly at stake.
- Blame-responsibility can be applied to individuals and perhaps to organizations. In any case, organizations can be criticized for the harms they cause, asked to make reparations for harm done, and assessed as needing to be reformed.

# Summary Chapter 2

## Responsibility in Engineering

- if a harm has resulted from collective inaction, the degree of individual responsibility of each member of a putative group for the harm should vary based on the role each member could have played in preventing the inaction. **Principle of responsibility of inaction in groups**
- In a situation in which harm has been produced by collective action, the degree of responsibility of each member of the group depends on the extent to which the member caused the action by some action reasonably avoidable on his part. **Principle of responsibility of action**

- Individuals can be responsible for harm by intentionally, recklessly, or negligently causing harm.
- There are many impediments to the kind of discernment and judgment that responsible engineering practice requires. Self-interest, fear, self-deception, ignorance, egocentric tendencies, microscopic vision, uncritical acceptance of authority, and groupthink are commonplace and require special vigilance if engineers are to resist them.

# Summary Chapter 3

## Framing the Problem

- Most of us agree about what is right or wrong in many particular situations, as well as over many moral rules or principles. Nevertheless, we are all familiar with moral disagreement, whether it occurs with respect to general rules or principles or with respect to what ought to be done in a particular situation.
- It is possible to isolate several sources of moral disagreement. We can disagree over the factual issues relevant to an ethical problem. There can also be conceptual issues about the basic definitions of key ideas (e.g., "What is *bribery?").* Finally, there can be application issues regarding whether certain concepts actually fit the case at hand (e.g., "Is *this* a case of bribery?").
- Good moral thinking requires applying relevant facts (including laws and regulations), concepts, and moral rules or principles to the case in question.

# Summary Chapter 3

## Framing the Problem

- Line-drawing techniques can be used in cases in which we are unsure how to distinguish between acceptable and unacceptable actions. By comparing problematic cases with those where it is clear what we should do, we can often decide what we should do in the problematic cases.
- Often we face two or more conflicting morally important values. Sometimes, one value seems to be so much more important than the others that we must choose to honor the more important and, at least for the moment, neglect the others.
- At other times, however, we may be able to come up with a creative middle way, a solution to the conflicting values that enables us to honor all of the relevant values. Often it is useful to think of a range of solutions to the conflict. We should first attempt to act in accordance with the solution that most satisfactorily honors the competing values.

# Summary Chapter 4

## Organizing Principles

- We have seen in this chapter that utilitarian and respect for person's approaches to moral problems sometimes assist us in attempting to resolve moral problems.
- The utilitarian standard says, "That which is likely to bring about the greatest overall utility to those affected determines what is morally right." We have presented three utilitarian approaches to problems: cost/benefit, act utilitarian( Max good consequences), and rule utilitarian (Universalize).
- The moral standard of respect for persons says, "those actions or rules are right that accord equal respect to each person as a moral agent." We have presented three respects for person's approaches as well: Golden Rule reasoning, determining whether universalizing a course of action would be self-defeating, and respect for rights.

# Summary Chapter 4

## Organizing Principles

- Utilitarian and respect for person's approaches can be combined in various ways with the methods for resolving line-drawing and conflict problems.
- Often the utilitarian and respect for person's approaches lead to the same conclusions. This convergence should strengthen our conviction that those conclusions are defensible. Even though the two approaches precede differently sometimes, and this divergence can lead to particularly difficult problems.
- Several suggestions may aid in resolving divergence problems. First, when the violation of individual rights is minimal or questionable utilitarian considerations may sometimes prevail. Second, in cases of divergence, it may be useful to employ line-drawing or creative middle way techniques. Third, when the violation of individual rights is serious, respect for persons considerations take on greater weight and utilitarian considerations are harder to sustain

# Summary Chapter 5

**Computer, Individual Morality and Social Policy**

- Computing raises few if any fundamentally new types of ethical issues, but it does raise several issues in new and urgent forms. One of these issues is the protection of privacy. Computer databases can severely compromise an individual's ability to control information, but they also provide many useful social benefits. A creative middle way solution would allow some information about individuals to be collected while providing limits to the nature and uses of the information.
- The unusual nature of computer programs also raises issues as to whether and how they should be legally protected. Proponents of individual fights usually argue that people should have the right to benefit from their own creative activity, and this suggests that software should have legal protection. The two most common types of legal protection are copyright and patent. Both types of protection should probably be available to software creators.

# Summary Chapter 5

## Computer, Individual Morality and Social Policy

- The moral status of various types of computer abuse varies, depending on such factors as the attitude of the perpetrator, the damage done by the abuse, the expense of repairing the damage, and the social value of the abuse. Legal sanctions against such abuse should probably generally be consistent with its moral seriousness.
- Blame-responsibility for harm can be on the individual or the organizational (or corporate) level. Blame-responsibility should be assigned on the basis of the degree to which negligence was a causal factor in the harms.
- Helen Nissenbaum has suggested two ways to increase accountability in a computing society: (I) promote standards of care in computer science and computer engineering and (2) impose strict liability for defective software that affects individuals and society.

# Summary Chapter 6

## Honesty, Integrity, and reliability

- Engineering codes require engineers to be honest and impartial in their professional judgments. Forms of dishonesty include lying, deliberate deception, withholding the truth and failing to seek out the truth.
- From the standpoint of the ethics of respect for persons, dishonesty is wrong because it violates the moral agency of individuals by causing them to make decisions without informed consent.
- There are, in fact, exact counterparts in the scientific research and engineering communities to the types of dishonesty exhibited by students: trimming data, cooking data, forging data, plagiarism, and multiple authorship.
- The concepts of integrity and reliability go beyond honesty but are certainly related to it. Areas of concern under this framework include intellectual property, expert testimony, confidentiality in client professional relationships, informing the public, and conflicts of interest.

## Summary Chapter 6
## Honesty, Integrity, and reliability

- Decisions as to the proper use of intellectual property with regard to trade secrets, patents, and copyrighted material are often difficult to make because they often involve varying degrees of use of intellectual property.
- An engineer may also misuse the truth by abusing client professional confidentiality This may be done either by breaking confidentiality when it is not warranted or refusing to break confidentiality when the higher obligation to the public requires it.
- Integrity in expert testimony requires engineers to take cases only when they have adequate time for preparation, to refuse to take cases when they cannot testify in good conscience, to consult extensively with the lawyer, and always to be open to new information.

# Summary Chapter 7
# Safety, risk, and liability in Engineering

- Engineers must protect the public from unacceptable risk.
- Engineers may find it difficult to advocate provisions in the building codes that promote safety or to resist changes that lower the ability of the codes to protect he public. Also it is hard for them to estimate the risk as the limitation of the Fault and the Event tree illustrate.
- “Tight Coupling” and “Complex interactions” are features of the parts of the technological system.
- Engineers also expose the public to risk by allowing increasing number of deviancies from the proper standards of safety and acceptable risk.

# Summary Chapter 7
# Safety, risk, and liability in Engineering

- Approaches to assessing and managing risk with regard to technology:

1. Risk Experts: Define risk as the product of the probability and the magnitude of harm.( An acceptable risk in utilitarian terms= The probability of harm is at least equal the probability of producing benefit)
2. Laypeople: They do not distinguish between the definition of risk and of acceptable risk.( Non utilitarian considerations=>the just distribution of risk, whether risk is voluntary assumed and whether risk could lead to catastrophe)
3. Government regulators are concerned with protecting the public from harm than in benefiting the public.

# Summary Chapter 6
# Honesty, Integrity, and reliability

- Engineers also misuse the truth when they fail to seek out or inform employers, clients, or the public of relevant information, especially when this information concerns the health, safety, and welfare of the public.
- A conflict of interest exists for a professional when, acting in a professional role, he or she is subject to influences, loyalties, or other interests that tend to make the professional's judgment less likely to benefit the customer or client than the cus-tomer or client is justified in expecting. Conflicts of interest can be actual, poten-tial, or apparent. A special case of conflict of interest is accepting gifts from vendors and others. The line-drawing method is again a useful tool in deciding when accepting a gift is permissible.

# Summary Chapter 7
# Safety, risk, and liability in Engineering

- Engineers should also be aware of the ethical and professional issues regarding risk that are raised in the law.
- The principle of acceptable risk summarizes the requirements for people to be protected from the harmful effects of technology while considering the need to preserve great and irreplaceable benefits and the limitations on our ability to obtain informed consent.

# Summary Chapter 8
# Engineers as Employees

- Engineering codes require engineers to be faithful agents of their employers, but they also require them to hold paramount the safety, health, and welfare of the public.( might produce conflict)
- Through the common law doctrine, employees may be able to expect some protection from the courts if they can show that their actions can be justified by considerations of the welfare of the public.
- Engineer-Manager relationship is the center that engineers face as employed professionals.
- Decisions should be made by engineers if they involve engineering-related technical matters or if the ethical standards of engineers are at stake. PED
- Decisions should be made by managers if they involve factors relating to the well-being of the organization (cost, scheduling, marketing, employees morale, or welfare) and if they do not force engineers to compromise their technical practices or ethical standards. PMD

# Summary Chapter 8
# Engineers as Employees

- Managers justify obedience by engineers through the argument of  loyalty:

1. Uncritical loyalty: Unquestionable obedience.
2. Critical loyalty: Questionable obedience. (Organizational disobedience through contrary action, disobedience by nonparticipation or disobedience by protest<whistle-blowing>)

- Employers have used several methods to improve communication with employees.

1. Open door policy, registering differing professional opinions
2. An office devoted to ethical issues (ethics hotline)

# Summary Chapter 9
# Engineers and the Environment

- The codes of four professional societies IEEE,ASCE,ASME and AICHE make explicit reference to the engineer's obligation to protect the environment.>>>Engineers have an obligation to promote an environment that protects human health and welfare.
- Reasons why including environmental provisions in the codes is controversial for engineers:

1. Managers are not sympathetic to environmental concern.
2. It is difficult to provide an acceptable criterion for a "clean" environment.

# Summary Chapter 9
# Engineers and the Environment

- Some managers believe:“ the primary role and duty of management really is to make money". The second category is called “cost-oriented environmental management". A third group is called “enlightened environmental management”.
- The degree-of-harm criterion: When pollutants pose a clear threat, they must be reduced below any reasonable threshold of harm. Cost should not be considered a significant factor.
- Anthropocentric ethics hold that only humans are morally considerable >> have intrinsic values.

The movement to protect the non humans can be thought of in two parts

1. The animal liberation movement.
2. The environmental movement

# Summary Chapter 9
# Engineers and the Environment

- The law suggests that an acceptable criterion for a clean environment must contain a balance between considerations of cost and technical feasibility on the one hand and the need to protect human health on the other.
- The environmental movement has focused public attention on non-health related environmental concerns but it is justifiable to put attention on to the environment on the grounds that it is essential to protect human welfare in area as recreation and renewable natural resources.
- Codes should protect the rights of engineers to engage in public efforts to protect the environment, to protest employer actions that they believe are environmentally destructive, and to refuse to engage in projects they believe are environmentally destructive.

# Summary Chapter 10
## International Engineering Professionalism

- Engineers face difficult decisions in moving from their country of origin ”home country” to another country ”host country”.
- As an aid in making decisions about what values to adopt, it useful to identify values and norms that are as near to being universal as possible. (major ethical philosophers religious teachers, UN declaration of human rights).
- **CT norms**>>Cultural-transcending norms (universal or near universal values) **9CT norms**.

1- Avoiding exploitation.
2- Avoiding paternalism.
3- Avoiding bribery and gifts.
4- Avoiding the violation of human rights.
5- Promoting the host country’s welfare.
6- Respecting cultural norms and laws.
7- Protecting health and safety.
8- Protecting the environment.
9- Promoting legitimate background institutions.

# Summary Chapter 10
## International Engineering Professionalism

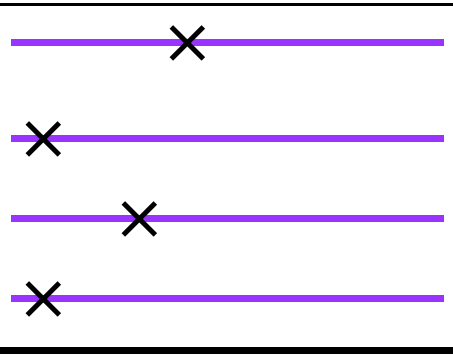
- **Engineers should:**

1. Avoid moral laxism and rigorism
2. Give presumption to host country's norms when they do not conflict with CT norms
3. Look for a creative middle way between home country and host country norms
4. Realize that maybe CT norms can be infringed
5. Acknowledge tat CT norms may conflict

**Engineers must distinguish Bribery from extortion, grease payments and gifts.**

# Case 66 Whose Property? Part I

**Paradigm and Test Case Features**

| Negative Paradigm (Clearly wrong) | Test Case | Positive Paradigm (Clearly acceptable) |
|---|---|---|
| Signed agreement |  | Permission granted |
| A & B competitors | | A & B not competitors |
| Ideas jointly developed | | Derek Idea's only |
| Ideas developed on job | | Ideas developed off job |

It is obvious that the software is a proprietorship of the old company (A) thus Derek has no right to use the idea of the software in the new company (B)

# Case 66 Whose Property? Part I

- It now occurs to him that by making a few minor alterations in the innovative software system he helped design at the small computer firm, the task of cross referencing can be greatly simplified
- On Friday, Derek decides he will come in early Monday morning to make the adaptation. However, on Saturday evening he attends a party with two of his old friends, you and Horace Jones. Derek mentions his plan to adapt the software system Horace asks, “Isn’t that unethical? That system is really the property of your previous employer” “But,” Derek replies, ‘I’m not selling the system to anyone, or anything like that. It’s just for my use and, after all, I did help design it. Besides, it’s not exactly the same system I’ve made a few changes.”

## Case 66 Whose Property? Part I

- Violation of copyrights, patents, trade secrets is prohibited by law in most circumstances. computing professionals are obliged to protect the integrity of intellectual property.
- Under Professional Obligations, code requires engineers to “recognize the proprietary interests of others.” Derek has no right to use the innovative software developed in the old firm.
- Using the software will improve the work and will give a competitive advantage for the new firm which will be considered as unethical act.
- The software is the old firm proprietorship and thus must not be used.

# Case 66 Whose Property? Part II

- Derek installs the software Monday morning. Soon everyone is impressed with his efficiency. This does not go unnoticed by his superiors, so he is offered an opportunity to introduce the system in other parts of the company.
- Derek suggests that his previous employer be contacted and that the more extended use of the software system be negotiated with the small computer firm. This move is firmly resisted by his superiors, who insist that the software system is now the property of the larger firm.
- If Derek doesn't want the new job, they reply, someone else can be invited to do it; in any case, the adaptation will be made.

# Case 66 Whose Property? Part II

- **What should Derek do now?**
  - Derek must refuse the new job. No further installation  must take place without permission of the smaller firm.
  - Derek must inform the smaller firm on what is happening in order to prevent the larger firm from using the innovative software.

# Case 48 Reformed Hacker?

- From Outlaw to Consultant" John P Draper is attempting to become a "white-hat" hacker as a way of repaying society for previous wrongdoing. In the early 1970s, Draper became known as "Cap'n Crunch" after discovering how to use a toy whistle included in a Cap'n Crunch cereal box to access the telephone network in order to get free telephone calls. While serving time in jail for his misdeeds, he came up with the early design for Easy Writer, IBM's first word-processing program for its first PC in 1981. However, in subsequent years Draper used his skills to hack into computer networks, became a millionaire, and then lost jobs and became homeless.
- Now, however, Draper has been enlisted to help operate an Internet security software and consulting firm that specializes in protecting the online property of corporations. Draper says, "I'm not a bad guy but I'm being treated like a fox trying to guard the hen house. "

# Case 48 Reformed Hacker?

- The past actions of the reformed hacker are both disruptive and expensive to remedy. Draper has violated the property rights of many companies by braking into computers to obtain unauthorized information.
- He has abused of his professional skills and knowledge to enter into security networks and gain money. He has caused intentional harm to many firms without caring about the losses and damage he is causing.

| Feature | Moral Culpable | Test Case | Not Moral Culpable |
|---|---|---|---|
| Attitude | Malicious | | Benign |
| Damage | Great | | None |
| Expense | Great | | None |
| Social Value | None | | Great |

Line Drawing Test – Past Actions of the Reformed Hacker

# Case 41 Oil Spill?

- Peter has been working with the Bigness Oil Company's local affiliate for several years. The facility, on Peter's recommendations, has followed all of the environmental regulations to the letter, and it has a solid reputation with the state regulatory agency.
- Jesse, manager of the local facility has been so pleased with Peter's work that he has recommended that Peter be retained as the corporate consulting engineer.
- One day, over coffee, Jesse starts telling Peter a story about a mysterious loss in one of the raw petrochemicals. Sometime during the 1950s, a loss of one of the process chemicals was discovered when the books were audited. After running pressure tests on the pipelines, the plant manager found that one of the pipes had corroded and had been leaking the chemical into the ground. After stopping the leak, the company sank observation and sampling wells and found that the product was sitting in a vertical plume, slowly diffusing into a deep aquifer.

# Case 41 Oil Spill?

- Because there was no surface or groundwater pollution off the plant property, the plant manager decided to do nothing.
- Peter is taken aback by this apparently innocent revelation. He recognizes that state law requires him to report all spills, He frowns and says to Jesse, “We have to report this spill to the state, you know.”
- Jesse is incredulous. “But there *is* no spill. If the state made us look for it, we probably could not find it; and even if we did, it makes no sense whatever to pump it out or contain it in any way.”
- “But the law says that we have to report...,” replies Peter.
- “Hey, look. I told you this in confidence. Your own engineering code of ethics requires client confidentiality. Let me be frank. If you go to the state with this, you will not be doing anyone any good—not the company, not the environment, and certainly not your own career. I cannot have a consulting engineer who does not value client loyalty.”

# Case 41 Oil Spill?

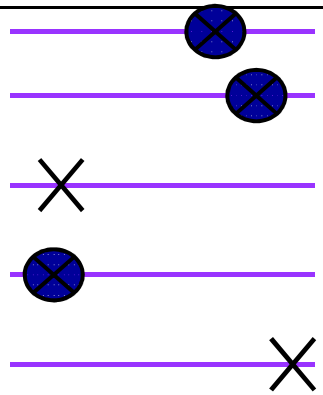
- **What are the ethical issues in this case? What factual and conceptual questions need to be addressed? How do you think Peter should deal with this situation?**
  - The old manager has acted irresponsibly. He has risked the public health and safety. He should have reported about the spill many years ago in order to take the appropriate precaution.
  - Peter is now confronting a conflicting situation. No detailed information is available to consider the risk of the spill on people health nowadays. There is no concrete evidence that the spill is still causing water pollution.
  - Peter must notify the state about the spill in order to conduct appropriate investigation on the subject and determine the possible harm that can be caused. His fear from loosing his new position must not interfere with his responsible obligation toward public welfare.
  - An alternative could be to make the company conduct his own investigation to asses the situation and repair the damage caused from the spill without telling the state.

# Case 63 ValCo

- Tom has been named the manager of a large new chemical plant that is still to be designed and constructed. Tom's responsibilities are to assemble and supervise the design staff; ensure that the plant is safe, operable, and maintainable; and start up the plant after construction. Tom recommends that the design staff specify a new ValCo valve to replace traditional gate valves.
- Consider the following series of cases:

# Case 63 ValCo

- *Case I: ValCo valves are superior to traditional gate valves because they seal more tightly and more quickly. After a large number of ValCo valves have been ordered, Jim, the ValCo sales-man, visits Tom and gives Tom a pen. The pen is worth $5.*
- *Should Tom accept the pen?*

| Feature | Paradigm (Bribery) | Test Case | Paradigm (not Bribery) |
|---|---|---|---|
| Gift size | Large |  | small |
| Timing | Before decision | | After decision |
| Reason | Personal Gain | | other |
| Responsibility | Sole | | none |
| Product quality | worst | | Best |

Line-Drawing Test of Concepts suggest that tom may accept the pen without considering an act of bribery.

# Case 61 Unlicensed Engineer

- Charles Landers, former Anchorage assemblyman working for Constructing Engineers, was found guilty of forging partner Henry Wilson's signature and using his professional seal on at least 40 documents.
- The falsification of the documents was done without the knowledge of Wilson. The signed and sealed documents certified to the Anchorage city health department that local septic systems met city wastewater-disposal regulations.
- Circuit Judge Michael Wolverton banned Landers for one year from practicing as an engineer's assistant. He also sentenced Landers to 20 days in jail, $4,000 in fines, and one year of probation. Judge Wolverton added that Landers's actions constituted a serious breach of public trust. The public, relies on the word of those, like professional engineers, who are entrusted with special responsibilities.

# Case 61 Unlicensed Engineer

- **Identify and discuss the ethically important elements in this case.**
  - Landers committed an act of **Dishonesty** by falsifying Wilson signature and using his professional seal. He certified documents without consent of the formal engineer with the **Intention to Deceive**.
  - Even if the actual conveyed information are not wrong, Landers was not sure about the accuracy of data. His intention was to **Lying**.
  - Landers put in risk the reputation of the company as well as the **Integrity and the Reliability** of the engineering society
  - Engineers are professionals who are responsible of their act and upon which public can rely that is why it is not acceptable to permit such action to occur inside the engineering society.