Ethical and Legal Issues (Chapter 11)
Most engineering disciplines have associate with them a professional society organization.

The objective IEEE organization is to support the Electrical Engineering field.

The IEEE Code of Ethics define accepted practices of their members that are embodied in an ethical code.
Negligence and Liability

Two standards for determining legal liability are the negligence and strict liability

- Negligence
  A company or person can be sued for damages caused by product design, and be held liable for negligence if the plaintiff demonstrates:
  - Manufacturer had a duty to follow standards and rules.
  - Failed to include safety devices.
  - The plaintiff was harmed.
Strict liability
There are different levels of negligence: simple, gross, and criminal. A less stringent standard than negligence is *strict liability*:
- The product was dangerous/defective.
- The defect existed when it left the manufacturer’s control.
- The defect caused harm.
Case Study Analysis

A good way to develop decision-making skills is by examining case studies.

- Go through the step of analyzing a case study employing the IEEE Code of Ethics as a guide.

- Use a paradigm used by Lockheed Martin Corporation in their employee ethics training program.
1. Gather information – Things that are known about the situation.

2. Identify stakeholders – Who will be affected by the decision?

3. Consider what ethical values are relevant to this situation – Identify the elements in the IEEE Code of Ethics.

4. Determine a course of action – Identify different alternative decisions and actions.
Example:

Ethics Case Study for Flawed Chip Design (Texas A&M Ethics Case Studies, http://ethics.tamu.edu)

Discussion:
Gather information

- The information makes it clear that the calculator may fail in precision beyond the 13\textsuperscript{th} digit needed.
- What is not know is the standard precision of a calculator. An internet search indicates that most scientific calculators have 10–or 12-digit display plus two digits for power.
- Going to the 13\textsuperscript{th} digit implies a higher than normal precision calculator.
- A calculator with 17 significant digits would likely be used by scientists and engineers.
Example:

Identify stakeholders

- Users of the calculator. In certain situations, the user can make an incorrect calculation.
- Public. The users of calculator may perform calculations that could affect safety of public. This could be a real possibility given the likely users.
- Company and employee. There are negative ramifications of releasing a faulty product. This could result in monetary harm to the employees for the company that you work for.
Example:

Identify relevant ethical values (from IEEE Code)

1: Release of the faulty calculator has the potential to endanger the safety of the public.

3: There is a need to be honest in stating claims as to the precision of the calculator.

9: There is clear potential to injure the reputation of the company and its employees.

In terms of legal issues, the company would be opening itself to claims of negligence, particularly since the defect was identified prior to the release of the product.
Determine a course of action:

Three possible courses of action are:

• A: Release the product as is without notifying the customers. This is not a good choice because of the potential harm to the safety of the public. It may also be illegal if the calculator is advertised to work to 17 significant digits.

• B: Use the chips in a different calculator that is guaranteed to compute only at a lower precision. The company would have to be producing one, the technology would have to be compatible.

• C: Throw away the chips and take a loss on their production and correct the problem.
Example:

Options B and C are both reasonable choices. Option B reduces economic losses, but there is a need for an acceptance testing.

Option C is the safest solution.

Option A might be seen as a viable choice, however, since it could be reasoned that handheld calculators are not often used for safety-critical applications. That is a risky assumption and the potential negative effects are great.