ENGR 201
Study Notes
March 15, 2017
M.N.

Lesson 1: Professional Systems:

Podcast: Professional System and the Role of Professionals in Society

Modern professionals share four main attributes. These attributes are:

- Intellectual skills that are acquired through a formalized system of education or training.
- The exercise of judgment on matters connected with the practice of work.
- Membership in self-governing societies.
- Their practice of work contributes directly to advance public welfare.

Two kinds of professionals:

- Independent Professional:
    - Work independently and are paid directly by the client for the service provided by the professional.
    - Has greater autonomy
    - Example: A consulting engineer or a private doctors or architects.

- Employed Professional:
    - Hired by a company or organization.
    - Monthly salary = professional provides their services to their employer.
    - Lesser autonomy
    - Example: a manufacturing engineer working for a company.

Professional Systems:

- The professional system can be defined as a formalized organization that links professionals with society they operate within.
- Objective: to ensure that professions are organized to be accountable to society
- Common aspects:
    - Most professional systems have formal rules (sometime laws) that govern the actions of individual professionals.
    - Professionals become members of a profession when they receive a license to practice the profession. This allows the individual to practice that profession.
    - Breaking rules can result in penalties and even loss of license.

Podcast: Professional System and the Role of Professionals in Society

Need for a Professional System:

Alan Firmage makes the point that “all professions are moral enterprises that involve concerns beyond the application of technical principles.”

Objective: to recognize the moral and ethical nature of professional work and create conditions, whereby member professionals will be guided to make ethical choices that work towards the benefit of society.

Values Behind a Professional System:

- Guide the nature of professional relations with clients, employers, and fellow professionals.
    - Honesty
    - Integrity
    - Loyalty
    - Responsibility
- Professional should relate to the values that underpin a particular society or nation they work within.
    - Law
    - Prejudice
    - Safety

All other values are personal values. Mixing personal and professional values would be considered a “conflict of interest” and should be avoided.

Roles of Professions in Society

Professions are a powerful occupational group in society.
The power that a profession has in society translates directly into the higher social status that professionals have in society. This higher status is the result of two factors:

- Society values professionals for the skill and expertise they possess in contributing directly to public welfare.
- Society values professionals for the skill and expertise they possess in contributing directly to public welfare.

Historical Development of Professionals

Ancient World: Professional was a person who professed their faith or religion publicly.

Medieval Europe: Religious order and Secular Guilds (concerned with guilds)

- Guilds: Organizations created to preserve the rights and privileges of membership and received authority from the king.
    - Merchant Guilds: Protect traders
    - Craft Guilds: group of craftsmen involved in same profession.
        - Bakers
        - Carpenters
        - Cobblers
        - Masons
    - Two Factors:
        - Inequality between peasants and landlords
        - Restricted movement between levels of wealth
    - Functions:
        - Responsibilities:
            - Restrict poor workmanship
            - Regulated prices
            - Limited number of masters
        - Services:
            - Health insurance
            - Supported dependants of members in case of death

        - Donations to the city
        - Public buildings
        - Served as counselors
    - Craftsmen: owned businesses that produced goods and services
    - Apprentice: worked for craftsmen to learn the craft
    - Journeyman: worker with a daily wage

Modern World:

- Business Entrepreneur:
    - Owns a business enterprise
    - Generates revenue from human, financial or physical capital
- White Collared Worker:
    - High salary
    - Administrative or technical work
    - Risk of obsolescence
- Blue Collared Worker:
    - Sell their manual work (low skilled/non skilled)
    - Hourly wages with low or no benefits
    - Risk of technological obsolescence

Lesson 2: Professional Systems in Quebec:

Podcast: The Professional System in Canada

- Formal nature of control over individual professionals. This formal control is created by making professional associations statutory bodies.

- In order to practice most professions in Canada, an individual has to become a member of the corresponding professional association.

- A person, who practices the profession without an explicit license, is considered to be practicing the profession illegally and could face legal action.

- A social contract model for professional associations allow it to clearly define how professional associations contribute to improving public good.

- A collective bargaining model is common for labour unions. In a collective bargaining model, associations are groups that try to further private interest rather than public good.

- the professional system in Canada follows the social contract model

Podcast: Evolution of Québec's Professional System

History of Professions in Québec

- The model of professional regulation that developed in Québec bore the influences of professional systems from France and Britain.

- 1970: weak social contracts because of three factors:

    - The professional system did little to be explicitly accountable to society

    - A liberal professional operated with limited oversight and was independent to conduct their professional practice.

    - A related aspect was the absence of a strong, legally binding code that governed the conduct of individual professionals.

Impetus for Change

- 1960-1970: The Quiet Revolution
    - To begin a period of massive state intervention into the affairs of society at different levels in order to transform the province from a traditional, conservative society to a progressive and modern one.

- The Castonguay-Nepveu Commission recommended reorganizing the professional system and strengthening the professional system's social contract.

Quebec's Revamped Professional System

- 1973: The National Assembly of Quebec initiated the reorganization of the new professional system.
- The Professional Code:

    - Is a law that lays down in detail how Québec's professional system should be organized and administered.
    - Specifies the actions of different professional orders that are part of the system.
    - Creates a single law that applies to the entire professional system in the province.

Engineering Professional Associations in Canada:

Quebec: www.oiq.qc.ca
Ontario: www.peo.on.ca
Northwest Territories and Nunavut: www.napeg.nt.ca
Yukon: www.apey.yk.ca
British Columbia: www.apeg.bc.ca
Alberta: www.apega.ca
Saskatchewan: www.apegs.ca
Manitoba: www.apegm.mb.ca
Newfoundland and Labrador: www.pegnl.ca
New Brunswick: www.apegnb.com
Prince Edward Island: www.engineerspei.com
Nova Scotia: www.engineersnovascotia.ca

How the System is Organized

Professional System in Quebec

- OIQ = Ordre des Ingénieurs de Québec
    - Must be a member to engage in engineering activities
- Engineers Act:
    - Legal basis of OIQ
    - Defines a person as a member and person of the OIQ and enter their names on the OIQ roll.
    - Fields of Practice:
        - Railways
        - Dams
        - Electrical
        - Mechanical
        - Waterworks
        - Structures

- Soil
- Industrial

Lesson 3: What are Ethics?

Professional ethics is how an individual acts within a company or organization. Engineering ethics is a form of professional ethics.

Engineering Ethics: the analysis of decisions, choices and policies that are morally desirable in engineering practice and research.

Reasons to why EE is important:
- Unethical practice is not good for public welfare.
- Provides a mean to prevent poor decisions.

Main goals of EE:
- Moral awareness (awareness of value conflicts)
- Moral autonomy (think critically and independently)
- Moral imagination (create solutions)
- Moral communication (communicate)

Ethics is an understanding of the philosophical basis for making moral choices.

While ethics are the systematic analysis of human behavior, morals are customary norms of behavior.

Morals vary with time and geography, ethical frameworks are not specific to cultural or geographic contexts

While ethics are products of rational examination, morals are acquired through socialization or being a member of a particular community.

Absolutism is when we make the decision to punish a person because they lied since it is always wrong to tell a lie, irrespective of whether the lie was told for self-interest or to protect someone else.

Relativism is when you suggest that it is ok to hurt animals because in my community we believe it is an accepted thing to do.

Professional Morality:

Internal Influence (Self Governance)	BOTH (Code of Ethics)	External Influences (Governance by outside authority)
Ethics	Engineering Ethics	Law
Values	Engineering Ethics	Morals

Lesson 4: Ethical Reasoning

Take the time to analyze your choices. From this analysis, you should be able to present a clear reason to support the decision you make. It is this clear justification that demonstrates to your colleagues, your company, and your clients that you have thought through the decision very carefully and then arrived at the choice.

Analyzing a Decision:

1. Identify the moral values
2. Clarify key concepts
3. Obtain relevant information
4. Consider your options
5. Make a reasonable decision

Three Dimensions to Ethical Reasoning:

- **Reflecting on Choices:** reflect on the nature of choice we make and ethics provides a means to justify.
- **Analyzing Choices:** Analyze the choices carefully and create a reason on why you made this choice.

- **Making the Choice:** Make the most optimal decision.

Ethical Theories:

- Agent: person who acts = Aristotle's Virtue Theory
- Actions: Nature of the action = Deontological Theory
- Results: Consequence of the action = Consequentialist Theory

Mill's Utilitarianism: the best course of action in an ethical problem is the solution that produces the maximum benefit for the greatest number of people, with the benefit equally divided among those people.

Kant's Formalism (Duty Ethics): that every individual has a fundamental duty to act in a correct ethical manner.

Locke's Right's Ethics: Rights-based theory states that every individual has rights, simply by Virtue of his or her existence.

Aristotle's Virtue Theory: Aristotle observed that the quality or goodness of an act, object, or person depended on the function or goal concerned.

Dilemma: an ethical problem that requires a person to choose between two opposing courses of action

Ethics: The study of right and wrong. good and evil, obligations and rights, justice, and social and political ideals.

Logic: The study of the rules of reasoning. For example, under what conditions can an argument be proved true?

Lesson 5: Ethics and Organizations

Leadership: is related to guiding and directing the behavior of people in the workplace. The objective of this guiding behavior is to deliberately shape the outcomes of how co-workers perform at tasks and duties with the intention of achieving organizational goals.

Leadership Styles:

- **Autocratic style** – leaders adopt directive or controlling actions to enforce rules and activities.
- **Democratic style** – leaders take collaborative, responsive, and interactive actions with followers.
- **Laissez-faire style** – leader who fails to take responsibility of position. As a result, subordinates may have greater freedom, but there is little evolution of a coherent mission in the organization.

Organizational Structures Pressure:

- The knowledge of how the organization is structured is crucial for a professional to understand how information and commands flow in an organization.

- The decision-making process. Who makes decisions, and how formalized decision-making is in the organization affects how professionals can contribute to decisions.

Types of Professional Relationships:

- **Ideal Model:** Professional provides skill and judgment directly to the client. Professional is independent. Professional is autonomous on how to work. Discretion is quite high.

- **Invisible Client Model:** Professional works for the employer and the employer contacts the client. Less autonomous and their actions are governed by the organization they work for. Actions are decided by the employer.

Organizational Behaviour:

Study of people think, feel and do.

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- **Individual Influences:**
    - Motivation
    - Role Perception
    - Ability
    - Situational Factors

- **Group Influences:**
    - Leadership
    - Power in Influence
    - Team Dynamics

- **Organizational Influences**:

    - Organizational Structure: Relations between different roles people occupy in an organization. Represented as a chart.

        - Types of Organizational Structures: How employees and activities are grouped together. Organizes the chain of command.
            - Line
            - Line & Staff
            - Functional
            - Divisional
            - Matrix

    - Organizational Cultures:
        - Values
        - Assumptions

Lesson 6: Professional Loyalty and Trust

Loyalty is usually described as an attitude or character that is demonstrated by a person through their actions. A clear demonstration of loyalty is when a person puts the interests of a person or institution (such as family, community, or nation) before personal interests, even when such an action exposes the person to risk

Altitude Loyalty: considered an attitude or sentiment of a person. It is an emotional or identity response that arises from group affiliation

Agency Loyalty: arises from fulfilling contractual duties.

Loyalty in the professional context requires use of judgment to develop and practice loyalty.

For an engineer practicing in Québec, the **Code of Ethics for Engineers** directs engineers to create a bond of trust between the professional and the client (or employer).

According to the code of ethics, it is a binding obligation for all engineers to create a bond of trust. In order to build the **bond of trust,** the engineer is expected to take several measures:

- **Disclosure of limits:** Thus, the client does not overestimate the ability of the engineer to deliver.
- **Integrity and transparency:** Terms of agreement in writing, document trail
- **Availability and diligence:** making known the engineer's working hours and contacts, and then ensuring the client can reach the engineer during these hours. Vice versa.
- **Independence and impartiality:** Keep out conflict of interests.
- **Confidentiality:** the engineer needs to remember that they are not authorized to share any of the client's information unless stated otherwise.
- **Fees:** An engineer is expected to charge fair and reasonable fees that correspond to the services rendered.

Types of Conflict of Interests:

- Gifts, bribes, or kickbacks in order to influence their decision.
- Insider information for friends or relatives.
- Existence of interests in other companies. (cannot work at competition)

Values in Professional Relationship:

- **Trust:** Ability to rely confidentially in people, objects and circumstances. Reliances introduce risks
- **Loyalty:** Person puts an interest of a person, institution (community or family) before their own interests even at risk to themselves.
- **Dignity:** A feeling of respect or esteem that an individual hold themselves in
- **Honesty:** Is the ability to to trust and be trusted

Lesson 7: Duties to the Profession

Dignity:

- Is a feeling of respect or esteem that an individual holds themselves in.

- Professional dignity is considered a positive sense of esteem that the profession has collectively acquired.

- Can be easily compromised

- In Québec, it is a mandatory duty of each individual engineer to safeguard the dignity of the profession. This duty is prescribed in the province's Professional Code and in the Code of Ethics for Engineers.

Relationship with the Order:

- One important requirement is for an engineer to comply with any request from the Order to participate in the self-governance of the profession.

- The engineer must reply to any correspondence or letter from the Order as soon as possible. Delayed replies could form the basis for a disciplinary investigation.

- Individuals are forbidden to interfere, or otherwise, obstruct a professional inspection or investigation conducted by the Order.

OIQ Controls Over its Members:

- **Membership:** A member of OIQ is required to hold a permit issued by OIQ and their name be entered on OIQ's roll:

    1. Ensure registration on the roll every year on April 1st.
    2. Not be temporarily or permanently stricken off the roll of OIQ.
    3. Ensure that your permit is not revoked by the disciplinary council.
    4. Meet important membership conditions for member renewal. These conditions include not having a criminal record outside the profession in Canada or in another country. Another condition is to have completely paid any disciplinary penalties or assessment during the year.

- **Nature of Practice:**
    - Professional inspection is conducted at OIQ by the Professional Inspection Committee.
    - Another major aspect of professional practice that is controlled by OIQ is discipline and penalty.
    - In Québec, the OIQ has exclusive jurisdiction over any such investigations or disciplinary processes.
    - Investigations of malpractice are investigated by the Syndic.

- **Social Accountability:** The conciliation or arbitration process is a means adopted by OIQ to serve society. Any resident of Québec, who is unhappy over the fees they provided to an engineer and feels they were overcharged, can utilize OIQ's arbitration process to determine if they were actually overcharged.
    - Engaged only in a private practice and not employed by a company.
    - The OIQ can examine the quality of service provided by the engineer to verify if the client was overcharged or not.

Lesson 8: Duties Towards the Public:

Honesty:

Honesty can be interpreted as truth-telling.

Honest representation requires us to avoid both acts of commission and omission.

- Commision: deliberate lie
- Omission: neglect to mention a relevant event.

Obligations to be honest as an engineer:

- The engineer shall express their opinion on matters dealing with engineering, only if such opinion is based on sufficient knowledge and honest convictions.

- An engineer must be impartial in their relations between the client and the contractors, suppliers, etc.

- An engineer must safeguard their independence at all times to avoid situations of conflict of interest.

Whistleblowing: an act by an employee of informing the public or higher management of unethical or illegal behavior by an employer or supervisor.

- Internal: Going over the head of an immediate supervisor to higher level management.
- External: Going outside the company and reporting to the media or law enforcement agencies.

Steps:

- Bring attention verbally to the company
- If danger to safety then notify the Order.
- To go public is to approach the OIQ

Thinking about Inclusivity and Diversity:

Prejudice: an opinion formed without taking time and care to judge fairly, often based on incomplete and stereotyped information.

Discrimination: implies treating people differently because of some particular social attribute, such as race, gender or religion.

- **Direct:** directed against person(s) on the basis of prejudice.
- **Adverse Effect:** It is a discrimination that happens as a result of applying a rule or policy uniformly.
- **Systematic:** It is a discrimination that is rooted in accepted ways of doing things in a business, profession, or occupation. (Glass ceiling)

Diversity: the variety in different social categories, such as gender, race, ethnicity, age, religion, national origin or sexual orientation.

Multiculturalism: is an equal acceptance for social differences in terms of gender, age, sexual orientation, ethnicity, race or national origin.

The preservation and enhancement of multicultural heritage in Canada is the aim of the **Canadian Charter of Rights and Freedoms.** In addition, **Canada's Multiculturalism Act of 1988** protects aboriginal rights, and the rights of people to enjoy their cultures and use of languages other than English and French.

Duty towards the Public:

Engineers have a duty to safeguard the common public good in Québec.

Duty to Humanity:

- Engineers exist to protect and respect humans.
- No Discrimination. Violates the Charter of Rights and Freedom

Duty to Life and Environment:

- Act in a manner to safeguard the environment (mindful to pollution)
- To be mindful of the life, health, and property of every human.

Ethical Constructs:

Prejudice: See Above

Discrimination: See Above

Harassment: It occurs when a person is subjected to unwanted discriminatory behaviour that offends, demeans or humiliates.

- Sexual
- Racial
- Ridicule

Lesson 9: Legal Issues

Intellectual Property in Canada: (Property Laws)

- **Patents:** A Patent is a government grant that gives inventors exclusive rights to their inventions. It gives the inventor an exclusive right to make, sell, and use the invention
    - Can be given for a product, chemical composition or process.
    - Not be given for principle, theorem, idea or computer program.
    - 20 years from date it was patented.

- **Copyright:** A copyright protects the expression of information in literary, musical, dramatic, or artistic works. The work must be published, recorded, performed, or communicated in order for the copyright protection to apply.
    - Not eligible for copyright: − facts, themes, ideas, most titles, names, catchphrases, and other short-word combinations.
    - Does not require registration
    - One just has to put the copyright symbol next to their name, date in works and it's covered up to 50 years after death.

- **Trademarks:** A trademark protects marks used to distinguish goods or services of one organization from those of others.
    - Provided for: catch-phrases, short-word combinations, symbols or designs, or a combination of these.
    - The term of protection is 15 years, but it can be renewed indefinitely as long as it is in continuous use.
    - Three types:
        - Ordinary Marks: words and/or symbols that distinguish the goods or services of a specific firm (Dell or MacBook)

        - Certification Marks: identify goods or services that meet a standard set by a governing organization (LEED or Energy Star)
        - Distinguishing guise: identifies the shaping of wares or their containers, or a mode of wrapping or packaging wares (iPad)

- **Industrial Design Protection:** protects the shape, configuration, and pattern or ornament (or any combination of these) applied to a finished, mass-produced item.
    - Included: furniture, toys, household items, and vehicles.
    - Not include: the functional features of an article; a principle of construction, or how an article is built; the materials used in the construction of an article (for example, glass); colour; or ideas.
    - Not protected: the functional features of an article; a principle of construction, or how an article is built; the materials used in the construction of an article (for example, glass); colour; or ideas. \
    - Protection period is 10 years.

- **Integrated Circuit Topography (ICT) Protection:** refers to the three-dimensional configuration of electronic circuits used in microchips and semiconductor chips.
    - give you exclusive rights over the copying of the topography and the commercialization of circuits that are contained in the topography.
    - 10 year grant on original circuit design

Law and Legal Systems:

Law:

Law is a rule that regulates what is accepted or forbidden in a society.

- Public law: govern actions of the state
    - International law, constitutional law, administrative law, or criminal law
- Private law: Govern actions between private individuals
    - Commercial law, family law, property law

Legal Systems:

Legal system is the system that has built up around the process of implementing laws in a society. And becomes the basis for:

- The sources of laws and regulations that govern a society.

- The practices and customs followed by courts in interpreting laws to make decisions regarding legal disputes.

- And as frameworks that govern interpretation of statutes, legislation and bylaws.

Civil Law:

- Laws are written into systematic collections referred to as codes.
- Laws are created by legislatures alone.
- Legal decisions made by judges are based solely on applying the laws to the case.
- Justice is produced through an inquisitorial process led by the judge.

English Common Law:

- Is based on laws and earlier cases that are similar.
- Laws are created both by legislatures and judges on the basis of the precedence value of earlier cases and judgments.
- Legal decisions are based not only on laws but also on precedence value of previous judgments.
- Justice is produced through an adversarial process between two opposing sets of advocates with the judge acting as a neutral umpire.

Quebec's Legal System:

- Mixed legal system of English common law and French civil law.
- All criminal matters are decided through English common law.
- Property and civil matters for disputes between private citizens are based on the Québec Civil Code. Québec Civil Code is derived from French civil law
- Laws in the Québec Civil Code have been arranged systematically to form a code comprising ten books. Each book deals with a body of law, such as persons, family, successions, property, etc.

Occupational Health and Safety in Canada:

Occupational Health and Safety (OHS) legislation provides a framework to regulate and minimize exposure of workers to hazardous or dangerous working conditions and workplaces.

90% workers are governed under provincial legislation.
10% governed by federal OHS legislation. (federal workplaces aka airports)

Joint Health and Safety Committee (JHSC)

Key aspects of supervisor responsibility are:

- To ensure that workers use prescribed protective equipment devices.
- To advise workers of potential and actual hazards
- To take every reasonable precaution in the circumstance for the protection of workers

Worker responsibilities include:

- To work in compliance with OHS acts and regulations
- To use personal protective equipment and clothing as directed
- To report hazards and dangers.

Due diligence is a legal defence that suggests that all reasonable precautions, under the particular circumstances, were taken.

Québec OHS legislation called the **Act Respecting Occupational Health and Safety** (Québec) was introduced in **1979**.

Legal Systems in the World:

Civil Law:

- Laws are written into systematic codes
- Laws are created by legislatures.

Common Law:

- Laws are a result of results of legislations and previous cases.
- Laws are created by judges and legislatures

Muslim Law:

- Laws are derived from religious texts of Islam.

Customary Law:

- Laws are derived from customary norms, which are related to a particular community.

Mixed System:

- Mix of civil law, English common law and other laws.

Lesson 10: Responsibility and Liability

Contract:

- A contract is a legally binding agreement between individuals.
- A contract can be formally defined as a voluntary agreement made between at least two persons with the mutual intention of creating a legal obligation.
- The following elements decide if a contract is legal or not:

    a. Mutual voluntary agreement to enter into the contract.
    b. There must be evidence that an offer was made by one party and the other party accepted the offer and then entered into the contract.
    c. A contract should have a motive.
    d. If the contract is made on an illegal matter, then it is unenforceable in a court because the contract is considered illegal.
    e. The parties who enter into the contract have to be legal persons.
        - Non-legal person: Minor, Aboriginals, intoxicated, mentally unwell

Contract and Employment:

- Employment Contract: regular employees who work for an employer under regular wages
- Contract Employees: Workers who have an employment contract but on a fixed term
- Contract for Services: independent contractors who work for a client but is left free to do the assigned work.

- The employer:
    - Decides the work conditions of an employee
    - The employers owns the tools/equipment to get the job done
    - Who benefits from any loss/profits from the contract

Tort:

- Tort refers to the breach of a private obligation to not do wrong to another person.
- Derived from the French word tort.
- A good example of tort would be a person's private obligation to not make defamatory statements against another person.
- No punishment or imprisonment for a tort case

3 types of Tort:

1. **Intentional Torts:** when a person acts with the intent of causing harm to another person.
    a. Fraud
    b. Trespass
    c. Defamation
2. **Negligence Torts:** is caused when a person acted negligently to cause harm to another person.
    a. Nuisance
    b. Professional Negligence
    c. Product Liability
3. **Strict Liability Torts (not apply in Canada):** a person can be held responsible for damages caused to another person without any negligence or intention.

Liability (In Quebec):

- Enforced through *Quebec Civil Code*
- Civil liability refers to the responsibility of the guilty party to pay compensation to the plaintiff for damages or harms caused.
    - No punishment or imprisonment if charged

- Compensation of damages awarded if:
    - An act of omission in the design or construction of the product.
    - The plaintiff has to demonstrate that a consequence or damage took place.

    - Demonstrate that a cause-effect relation exists between the act of omission and the consequence or damage.

Liability Insurance:

- Liability insurance is purchased to address business liability risks that are not covered by general liability insurance.
    - Also known as:
        - Errors and omission insurance
        - Malpractice insurance
- In professional practice, a liability insurance policy pays other parties for damages for which the policyholder is legally liable as a result of negligent acts, errors or omissions in the performance of their professional service.
- The insurance is useful, because it protects the firm, the professional, or employees from serious financial disruption.
- The insurance provides clients with financial security for the professional services they have received.

The OIQ accordingly adopted a regulation requiring professional liability insurance for all members. Thus, every member of the OIQ shall join the group plan insurance contract (with a specified minimum coverage) to address professional liability.

Responsibility:

- Responsibility can be defined as responding to or answering for an action performed.
- Answering or accounting for the consequences of one's actions is what is implied by responsibility.

- In order to be held morally responsible for an action:
    - Verify who did the action
    - Nature of circumstances that guided the action

- A role (especially a social role) is a position that an individual holds.
    - Parent
    - Student
    - Teacher
    - Engineer

- Individuals are held responsible when they do not meet the expectations of the role they fill in society.
    - So if you are an engineer, there is an expectation that you will act responsibly when producing products for society. If you do not meet that expectation, you will be held responsible for it.

Evolution of Liability:

- If you do not meet the expected responsibility in your professional work, you could be held liable or legally responsible by the consumer or client for your actions, especially if it causes damage to them

- Types of Liability:

    1. **Extra-contractual:** responsibility that is owed by tort or regulatory damages
    2. **Contractual:** responsibility that is owed within the bounds of an explicit contract
- Caveat Vendidor: Let the seller beware
- With the increasing complexity of products, producers, manufacturers, and designers are now held legally responsible for the products they introduce in society.
- A good example of strict liability is the message that manufacturers put on plastic bags that the bags could be a choking hazard for children.
    - While strict liability is quite common in U.S., in Canadian courts, strict liability is not widely enforced.

Lesson 11: Issues in Professional Practice

Safety and Accidents:

- Safety is a key responsibility for engineers, both in the workplace as well as for the public.
- In thinking about public safety, an engineer needs to bear in mind both product and process safety.
- Accidents in an industrial environment:

    - **Procedural accidents:** Such accidents are attributed to operator errors, the failures to follow regulations or standard operating procedures.

        - Solution is to provide better operator training, supervision and regulation.

    - **Engineered accidents:** Such accidents result from flaws in engineering design or from sub-optimal performance.
        - Solution is to conduct better research and testing of materials and designs.

    - **Systemic accidents:** These accidents are the result of complexity and coupling between subsystems that lead to unforeseen accident pathways that can have catastrophic consequences.
        - Solution is to provide multiple redundancies to prevent cascading failures in industrial systems.
- In trying to address these different kinds of accidents, one means engineers have to improve safety is through design by:
    - Design must obey legal requirement
    - Design must comply with accepted engineering practice or keep up with the state of the art in knowledge and practices
    - Research all possible alternative designs, including discuss design strategies with other designers
    - Foresee possible uses and misuses especially in system design, and then create redundancies or backups to address system deficiencies.

Risk and Risk Communications:

- Risk can be defined as the probability of an event occurring and of the consequences of that event.
- Risk assessment is the determination of quantitative value of risk related to a recognized threat
- Models that attempt to assess risk:
    - Failure Mode, Effects & Criticality Analysis (FMECA)
    - Hazard Analysis & Critical Control Points
    - Failure Tree Analysis.
        - The objective of these methods is usually to identify, model, and evaluate the unique interrelationship of events leading to failure or unintended events.
    - Zero risk does not exist.

- Risk perception can be defined as the degree of sentiment of danger among individuals who are exposed to the source of risk.
- The goal of risk communication is to not only inform people and to warn them of potential risks, but also foster trust in the analysis/assessment of risk.

Compromise:

- Positive side of compromise arising from a conflict:
    - Arises from finding a common ground between differing sides in the spirit of mutual agreement.
    - It suggests the quality of flexibility on the part of individuals as they adjust their goals in light of the circumstance.

- Negative side of compromise from a conflict:
    - Suggests a willingness to surrender one's stated objectives and principles.
    - Suggests a sign of weakness in conviction
- Making a compromise is not an ethical compromise when individuals disagree on the relative importance of two different values

- A compromise is acceptable under some specific conditions:

    - If there is a great degree of factual or conceptual uncertainty in making the decision.
    - When the moral issue has great complexity and there is no black/white answer.
    - When there are resource constraints (time limits or physical inabilities) that will lead to an imperfect decision.
    - There is a danger of breaking vital cooperative relationships – team, friends, or family.

Conflict Resolution:

- It is important to consider two aspects regarding how individuals behave and think:
    - Assertiveness or the degree of concern individuals have about the self
    - Cooperativeness or the degree of concern individuals have about others.

- 5 modes of conflict handling:

a. **Competing mode:** Individual pursues self-interest at the other person's expense.
b. **Accommodating mode:** Individual neglects self-interest to consider the other person's needs.
c. **Avoiding mode:** Person avoids conflict situation and does not address it.
d. **Collaborating mode:** Works with the other person to find a solution that meets the interests of both persons.
e. **Compromising mode:** Only partially satisfies both parties.