

Topic 1: professional, professionals, clients, expert, independent

- INTRODUCTION Profession Profession is an occupation that requires advanced training in the liberal arts or sciences and mental rather than manual work(Davis and Cornwell)
- The professionalism is defined by following seven characteristics Professional decisions are made by means of general principles theories or propositions that are independent of the particular case under consideration
- Professional decisions imply knowledge in a specific area in which the person is expert
- The professional is an expert only in his or her profession and not as expert at everything
- The professionals relations with his or her clients are objective and independent of particular sentiments about them
- A professional achieves status and financial reward by accomplishment not by inherent qualities such as birth order race religion sex or age or by membership in a union
- A professionals decisions are assumed to be on behalf of the client and to be independent of selfinterest
- The professional relates to a voluntary association of professionals
- A professional is someone who knows better what is good for clients than do the clients
- The professionals expertise puts the client into a very vulnerable position
- This vulnerability has necessitated the development of strong professional codes and ethics which serve to protect the client
- Such codes are enforced through colleague peer group

Topic 8: benefit, structures, systems, society, constraints

- Engineering Engineering is a profession that applies mathematics and science to utilize the properties of matter and sources of energy to create useful structures machines products systems and processes (Davis and Cornwell)
- Engineering may be defined as the application under constraints of scientific principles to the planning design construction and operation of structures equipment and systems for the benefit of society (Sincero and Sincero)
- Engineering is the profession in which a knowledge of the mathematical and natural sciences gained by study experience and practice is applied with judgment to develop ways to utilize economically the materials and forces of nature for the benefit of human society
- In other words Engineering may be defined as the application under constraints of scientific principles to the planning design construction and operation of structures equipment and

systems for the benefit of the society

- Scientist discover things Engineers make them work

Topic 5: environmental, engineering, public, pollution, water

- If the tasks performed by environmental engineers were examined it would be found that the engineers deal with the structures equipment and systems that are designed to protect and enhance the quality of the environment and to protect and enhance public health and welfare
- Traditionally engineers were able to practice their profession without having to address environmental ethics to the same depth that is now required
- Environmental Engineering Environmental Engineering is defined as the application of engineering principles under constraint to the protection and enhancement of the quality of the environment and to the enhancement and protection of public health and welfare (Sincero and Sincero)
- Environmental Engineering is manifest by sound engineering thought and practice in the solution of problems of environmental sanitation notably in the provision of safe palatable (tastes pleasant) and ample public water supplies the proper disposal of or recycle of wastewater and solid wastes the adequate drainage of urban and rural areas for proper sanitation and the control of water soil and atmospheric pollution and the social and environmental impact of these solutions
- Furthermore it is concerned with engineering problems in the field of public health the elimination of industrial health hazards and the provision of adequate sanitation in urban rural and recreational areas and the effect of technological advances on the environment (ASCE)
- Traditionally the environmental engineering has been the province of the civil engineering profession
- Around the name sanitary engineering or public health engineering was changed to environmental engineering
- Source SOPHEN () In general Environmental engineering is focused on Provisions of safe palatable and ample public water supplies Proper disposal of or recycling of wastewater and solid wastes Control of water soil and atmospheric pollution including noise pollution Environmental engineers have the responsibility To plan design construct and operate sewage treatment plants to prevent the pollution of receiving streams
- To carry out environmental assessment of projects and products To provide inputs in decision making regarding the environmental issues of development sector and welfare of

public To predict the level of pollution and design control mechanisms and products One aspect of the profession of environmental engineering is that environmental engineer is engaged in a truly worthwhile mission

- The environmental engineer is the epitome of the solution as opposed to the problem

Topic 11: project, implementation, impacts, environmental, activity

- Any engineering project large or small a product being designed or a services to be provided encompasses within its implementation a series of decisions made by engineers
- This exercise ultimately leads to make a decision about the development of a project or an activity
- Engineering decisions are also based on the environmental impacts caused by the project activities which could be in planning implementation or operation phase
- While carrying out an environmental impact assessment (EIA) of a potential project a no project scenario is referred against the various alternatives which helps to identify the environmental impacts and engineering or social mitigation measures

Topic 0: technical, decisions, engineering, vesilind, morgan

- A far greater number of decisions however made hundred of times a day by hundreds of thousands of engineers are correct and improve a lot of the human civilization protect the global environment and enhance the integrity of the profession
- Because so few engineering decisions turn out poorly engineering decision making is a little known and rarely discussed process
- Often Engineers and Doctors are put on the same footing by the career choosers however a doctor can harm only one person at a time while engineer have potential to harm thousands at a time thorough incorrectly designed systems (Vesilind and Morgan)
- Technical decisions are quantifiable and can be evaluated and checked by other competent professional engineers
- In engineering there seldom is one best way to design a project or a product
- If there ever was a best way then engineering would become stagnant innovation would cease and technical paralysis would set in
- look alike (Vesilind and Morgan)
- The undergraduate engineering student is often taught during early years of an engineering education that each homework assignment and test question has a single right answer and that all other answers are wrong

- But in engineering practice many technical decision may be right in that a problem may have several equally correct technical solutions
- When carrying out technical analysis we often do not have all the information we need to make decisions
- The methods of decisions making available to engineers stretch from the most objective (technical) to the most subjective (ethical)
- The inherent method of decision making is the same in all cases
- When all the numbers are in and the variables are evaluated the information is synthesized into a solution (Vesilind and Morgan)

Topic 10: analysis, cost, questions, landfill, trucks

- Engineering decisions Engineering decisions could be based on () technical analysis () cost effectiveness analysis () cost benefit analysis () risk analysis () environmental impact analysis and () ethical analysis
- While technical calculations can answer technical questions questions of cost require a different form of engineering decision making ie
- Engineering typically find themselves working for an employer or client who requires that various alternatives for solving an engineering problem be analysed on the basis of the cost
- For example if a municipal engineer is considering purchasing refuse collection vehicles and finds that he or she can buy either expensive trucks that achieve great compaction of the refuse thereby making efficient trips to the landfill or inexpensive trucks that require more trips to the landfill how does the engineer know which is less expensive for the community

Topic 6: perfect, new, design, introduction, environmental

- Just as we recognize there is no single perfect work of art such as painting or a fashion design there is no perfect road or a water treatment plant
- If there were a perfect plant painting or a road all future water treatment plants or roads (not the alignment but the structure)
- Similarly a sewer can be constructed with a concrete cast iron steel aluminum plastic or clay materials
- With correct engineering design procedures such a sewer would carry the design flow and thus would be technically correct (Vesilind and Morgan)
- Based on the these values calculation of acceptable levels of pollution is also possible
- Similarly life cycle assessment (LCA) of products is increasingly used in identifying the

environmental impacts caused by the manufacturing process and use of the products

- Additional Reading References ASCE () Official Record Environmental Engineering Division Statement of Purpose American Society of Civil Engineers New York Davis M L and Cornwell D A
- () Introduction to Environmental Engineering Fourth ed Tata McGraw Hill Education Private Limited New Delhi India Sincero A P and Sincero G A
- () Environmental Engineering A Design Approach Prentice Hall of India Reprinted New Delhi India Society of Public Health Engineers Nepal (SOPHEN) () Official introduction Website of SOPHEN https://sophen.org/nepwho_we_are/sophen.php (Downloaded on March) Vesilind P A and Morgan S M () Introduction to Environmental Engineering Thomson Brooks Cole

Topic 4: investment, projects, irr, return, rate

- If a project is planned an estimate of the benefits derived is compared in ratio form to the cost incurred
- Should this ratio be more than the project is clearly worthwhile and the projects with the highest benefit-cost ratios should be constructed first because these will provide the greatest returns on the investment
- Internal Rate of Return (IRR) is an indicator to reflect the profit of the projects
- The IRR is the annualized effective compounded return rate or rate of return that makes the net present value of all cash flows (both positive and negative) from a particular investment equal to zero
- In more specific terms the IRR of an investment is the discount rate at which the net present value of costs (negative cash flows) of the investment equals the net present value of the benefits (positive cash flows) of the investment
- Internal rates of return are commonly used to evaluate the desirability of investments or projects
- The higher a project's internal rate of return the more desirable it is to undertake the project
- Assuming all projects require the same amount of upfront investment the project with the highest IRR would be considered the best and undertaken first
- IRR values of some of the projects Often the benefits of a proposed project are not such simple items as recreational value but the more serious concern for human health or other social aspects
- Refer Box for details

Topic 7: risk, resources, analysis, health, potential

- When life and health enter benefitcost calculations the analyses are generally referred as riskbenefitcost analysis to indicate that people or resources are at risk
- They have in the past few years become more widely known as simply risk analyses
- Risk analysis is comprise do risk assessment and risk management
- The former involves a study and analysis of the potential effect of certain hazards on human health
- Using statistical information risk assessment is intended to be a tool for making informed decisions
- For example it has been shown that the life expectancy of people living in a dirty urban atmosphere is considerably shorter than that of people living identical lives but breathing clean air
- In addition to the potential effect to human health and well being environmental impacts also include effects on the natural resources or infrastructures providing socioeconomic services
- Risk analysis calculates the potential damage to the health and environmental impact analysis provides a means for decision making based on longterm effects on resources

Topic 3: risk, risks, people, smoking, imposed

- Risk management on the other hand is the process of reducing risks that are deemed unacceptable
- In our private lives we are continually doing both
- Smoking cigarettes is a risk to our health and it is possible to calculate the potential effect of smoking
- Quitting smoking is a method of risk management because the effect is to reduce the risk of dying of certain diseases
- Some risks we choose to accept while other risks are imposed upon us from outside
- We choose for example to drink alcohol drive cars or fly in airplanes
- Each of these activities has a calculated risk because people die every year as a result of alcohol abuse traffic accidents and airplane crashes
- Some risks are imposed from outside and we can do little about them
- We can do little about this risk and it is this type of risk that people resent the most
- In fact studies have shown that the acceptability of an involuntary risk is on the order of

times less than our acceptability of a voluntary risk

- Such human behavior can explain why people who smoke cigarettes still get upset about air quality or why people driving recklessly complain about the bad road conditions
- Thus for externally imposed risks it is essential to decide what levels of risks are acceptable

Topic 9: ethical, theories, values, conflict, attitude

- Ethics provide a systematized framework for making decisions where values conflict
- Ethical analysis involves values rather than cost or environmental data
- There are two theories leading to the ethical analysis utilitarianism and deontological
- A detail on these two theories can be found elsewhere
- An ethical perspective focuses on the attitude of people towards other living things and towards the natural environment

Topic 2: professional, sophen, members, nepal, international

- In Nepal Society of Public Health Engineers (SOPHEN) is an association working the sector
- Box Introduction to SOPHEN Society of Public Health Engineers Nepal (SOPHEN) was registered in Nepal in AD (BS) as an independent professional organization by a group of Nepalese Engineers
- At present it has members
- SOPHEN is governed by an executive committee of eleven members elected by the general members of the society
- Some of the major responsibilities of SOPHEN include the enhancement of technical and professional competencies of its members work for the protection of the basic professional rights and support the government and other agencies in the formulation of policies and strategies in related fields
- SOPHEN is committed to carry out various professional activities that are intended to bring qualitative results to improve the sanitary and environmental conditions of the country
- It aims to work in association with other professional bodies in Nepal and abroad
- SOPHEN has been recognized by all the sectors of the society as a leading professional body of Nepal
- Objectives Dissemination of stateofart technologies to practitioners policy makers and beneficiaries
- Establish professional relationship with similar institutions to national and international level sharing ideas and technologies for mutual benefits and interests

- Coordinate with other national and international professional bodies enhancing professional competencies to the implementation of emerging technologies
- Building capacities of its members through various research training and workshop in national and international level

Topic 13: operate, build, control, design, adopt

- Support the government to develop adopt and implement policies and strategies for overall development of sanitary and environmental conditions of the country
- To build and operate water treatment plants
- To build and operate solid waste collection transportation and disposal systems To plan design construct and operate air pollution control equipment
- To design reservoirs and to control groundwater contamination