Lecture 1
Environmental engineering

هندسة البيئة

Course Outline

- safety, vocational health,
- work environment and security.
- management of the industrial environment.
- hazardous solid residues; management and treatment.
- air pollution. description and evaluation of air quality and control.
- water and liquid affluent management.
- electromagnetic, radioactive and noise pollution.
- environmental management.

evaluation of environmental impact of projects.

- environmental planning..

- السلامة والصحة المهنية ،صحة
- بيئة العمل ، الامن الصناعي.
- ادارة البيئة الصناعية وبيئات العمل المختلفة .
- المخلفات الخطرة والمخلفات الصلبة ، ادارة المخلفات الصناعية ومعالجتها .
- تلوث الهواء ، وصف وتقويم جودة الهواء.
- التحكم في الملوثات ، ادارة المياه والمخلفات السائلة .
- التلوث الكهرومغنطيسي ، التلوث الاشعاعي ، التلوث الضجيجي .
- ادارة وتخطيط البيئة ،
- تقويم الاثر البيئي للمشروعات المستقبلية

References:

Øystein Førsvoll, "*HSE, Introduction to Health, Safety and Environment*", ISBN 978-82-412-0690-0, 2009.

E. Weiner and A. Matthews, "*Environmental Engineering*", 2003, Butterworth-Heinemann.

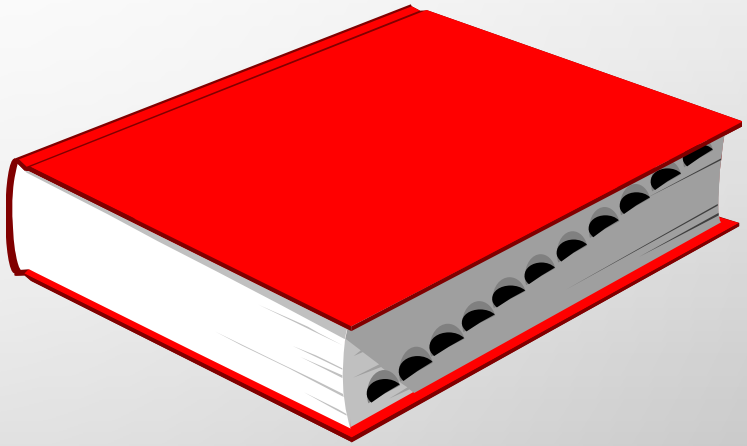
Motivations:

- Industrial health and safety: integral part of the expanded domain of the environment (***HSE***).
- Most engineering graduates do not undergo formal training.
- Reduced hazard and risks make for a safer work environment.
- Human consequences of accidents.
- Stricter laws and regulations.
- Product environmental and safety regulations.

Health And Safety

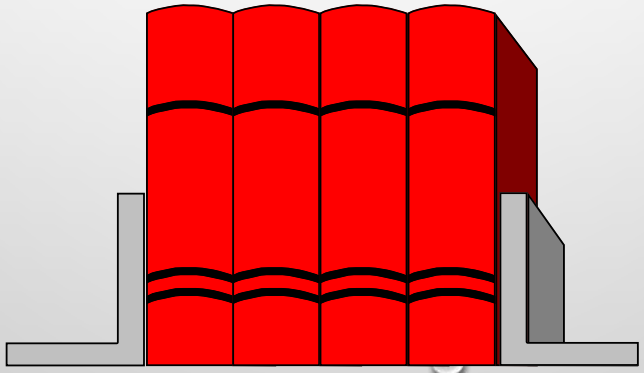
Definitions Of Health And Safety

- Health
  - a state of complete physical, mental and social well being and not merely the absence of infirmity or disease.



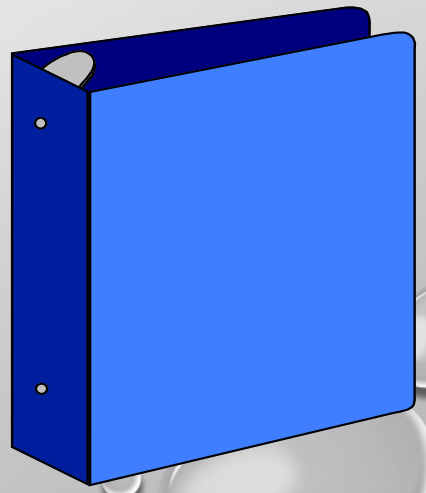
- Safety
  - security, freedom from danger and risk of damage or injury

Health And Safety Legislation



Health and safety legislation

- The factories act 1961
- The offices, shops & railway premises act 1969
- Employers liability (compulsive insurance) 1969
- The Fire protection act 1971
- The employment medical advisory service act 1972
- The Health & safety act 1974
- The Protection of eyes Reg. 1974
- Control of pollution 1974 (1984)
- Health & safety (first aid) Reg. 1981



Health and safety legislation

- RIDDOR 1985
- Noise at work Reg… 1989
- Electricity at work Reg.. 1989
- Health & safety for employees Reg..1989
- The environmental protection act 1990
- The management of Health & safety at work Reg..1992
- Workplace (Health, safety & welfare) Reg.. 1992
- Health and safety(Display screen equipment) 1992
- Personnel protective equipment Reg. 1992
- Provision and use of work equipment Reg..
- Manual handling operations 1992
- COSHH 1994

Health and safety at work act

- The purpose of the act. To provide the legislative framework to promote, stimulate and encourage high standards of health and safety at work.
- Scope of the act. It covers all people at work. The legislation protects not only people at work but also the general public who may be affected by work activities.
- Duty of employers. Employers must safeguard as is reasonably practicable the health, safety and welfare of people in their employ.
- Duties of employees. Employees have a duty to take reasonable care to avoid injury to them or to others by their work activities.

Legislation

- The workplace regulations 1992
  - The workplace and the systems included in it: i.e. ventilation, heating etc
- Provision and use of work equipment regulations 1992
- If equipment involves a risk only trained persons should use it.
- Adequate health and safety information, written instructions and training should be given.
- Prevention of access to dangerous parts of equipment.
- Emergency stop controls.
- Isolation from energy source.
- Clear warnings about equipment.

Legislation Cont.

- Management of health and safety at work reg. 1992 Assess health and safety risks. Put in to practice preventative measures. Provide health surveillance. Provide information and training. Liase with safety representatives.
- Personal protective equipment at work regulations 1992
- provide Suitable clothing which is compatible with other clothing worn. keep the Equipment in good repair. safe storage for equipment when not in use. Instruction and training about the risks the equipment

Legislation cont..

- VDU's(Health and safety display screen equipment) regulations 1992 Work station suitability.
- Covers: Activity of employees
- Adequate breaks.
- Provision of eye tests and corrective appliances when needed.
- Health and safety information for employees regulations 1992
- Every employer has a duty to ensure that an approved poster is displayed. Which is accessible to employees containing the name and address of the enforcing authority for the premises and safety training and information in the use of work stations.

Health an Safety (first aid) Regulations.

- Covers almost all employment situations
- An employer must provide or ensure provision of equipment and facilities for first aid to be given, if an employee is injured or taken ill at work.
- There must be a suitable number of people who can give first aid (a person who is qualified in first aid)
- Employees must be aware of the arrangements for first aid, including the location of equipment and personnel.

Hazards and Risks

- These two terms are central to health and safety issues they; form the basis upon which assessments are carried out.
- A Hazard is the potential of a substance to cause harm.
- A Risk is the likelihood of harm occurring in the actual circumstances.
- You can eliminate or reduce the risk by using proper procedures. You can not always eliminate the hazard.

Hazards and Risks

- example: if two offices were on opposite sides of the road and you had to cross from one to the other. the hazard is the road. the risk is crossing the road. we can reduce the risk by using a pedestrian crossing or eliminate it by using a subway but you cannot remove the hazard.

Hazards

- think about your own work place and using your own experience try to identify at least 3 potential hazards which you may have observed under the following headings:
  - floors and coverings
  - storage of goods and chemicals
  - fire hazards and fire prevention
  - use of electrical equipment
  - obstructions in pathways or gangways
  - use of mechanical equipment.

Risk assessment

- risk assessment is about identifying situations, substances and procedures which could present a risk to the health and safety of the people involved.
- to make an assessment we:-
  - decide the nature of the hazard
  - estimate the likelihood of an accident
  - the severity of accidents should they occur
  - measures to reduce or eliminate the risk
  - record the assessment

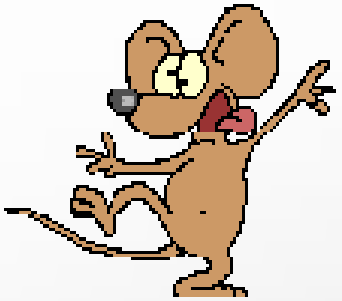
Control or Substances hazardous to health regulations (COSHH) 1994

- no work may be carried out which is liable to expose any employee to any substance hazardous to health unless suitable risk assessment has been undertaken.by the employer and be reviewed regularly and records kept.
- assessment includes :
- which substances are used and how often.
- how each substance is used, handled and stored.
- the risks to health: injury, illness or death from short / long term exposure
- the hazards of each substance i.e. could the substance be swallowed or inhaled or absorbed through the skin
- who is exposed. staff, visitors or contractors

COSHH

- what substances in your work place do you think might come under COSHH ?
- list them under the following categories:
  - gases/vapours
  - liquids
  - micro-organisms/biological agents
  - others - dust, fumes

Biological hazards



- **Bacteria**
  - salmonella, campylobacter, listeria, leptospirosis
- **Viruses**
  - Hepatitis, Flu, HIV
- **Moulds and fungi**
  - soft cheese moulds, mushroom spores, hay fungi
- there are many areas of the workplace where the employees or visitors can be exposed to biological hazards that could be dangerous substances

Handling loads

- the aim of patient handling policies are to eliminate hazardous manual handling in all exceptional /life threatening situations.
- patients should be encouraged to assist in their own transfers when possible and handling aids must be used when ever possible to reduce the risk of injury.
- handling patients manually can only continue only if it does not involve lifting most of the patients weight.
- RCN safer handling policy 1996

Handling loads

- it is the employers responsibility to: ensure that formal handling assessments are carried out.
- it is the employees responsibility to: take reasonable care for their own safety and that of colleagues, use equipment in accordance with training and instruction and comply with policies

Reporting of injuries, Diseases and dangerous occurrences regulations 1995 (RIDDOR)

- RIDDOR stands for the reporting of injuries disease and dangerous occurrences regulation
- reporting of accidents and ill health at work is a legal requirement. the information allows the health and safety executive and local authorities to identify where and how risks arise and to investigate serious accidents
- report incidents to the incident contact centre at Caerphilly or to the local health and safety executive.

RIDDOR Cont.

- Where an employee suffers an injury or illness which is reportable and which causes death within 1 year of the date of the accident.
- Where an employee suffers from a specified illness and his work involves specified activities.
- In the event of incidents involving flammable gas resulting in death or specified injury.

Reportable major injuries

- Fractures/dislocations other than fingers and toes.
- Amputation
- Chemical /hot metal burn to the eye.
- Penetration eye injury.
- Loss of of sight.
- Acute Illness or Unconsciousness caused by exposure to harmful biological agents or absorption of any substance inhaled or ingested.
- Electric shock/burn causing unconsciousness
- Electrical short circuit /overload causing fire or explosion.
- Collapse or failure of load bearing parts of lifting equipment.
- Explosion or bursting of any closed vessel or associated pipe work.
- Explosion or fire causing suspension of work for over 24 hours.
- Failure of radiography/irradiation equipment

Accidents and incidents

- What is the procedure in the following incidents ?
  - A sharps injury
  - An assault by a patient on a member of staff
  - A back injury/strain whilst moving a patient
  - what records should be kept
- What would you do in the following situations ?
  - You find a patient unconscious on the floor
  - A visitor is being verbally abusive to a patient
  - You see smoke coming from under the door of the linen cupboard

Procedure for an Injury at work

- Report the injury
- complete an accident form
- Attend G.P, A & E or Occupational Health
- Certificate for work
- student nurses should inform Nurse education dept.
- On return to work
- Certified fit for work
- Handling update if appropriate
- Inform Occupational Health

Fire

- what would you do if you discovered a fire in your workplace/clients home
- what types of fire could you tackle using the following appliances:
  - water hose/extinguisher
  - foam
  - powder
  - fire blanket
  - carbon-dioxide extinguisher

Fire safety in healthcare settings

- fire is covered by the nhs fire safety standards which outline the acceptable risks it covers:
  - patients
  - ignition sources
  - fire hazard rooms/fire zones (all fire hazard areas should be enclosed by a 30 minute fire resisting structure)