What is Mechanical Engineering?

No definition, just description.

- Application of scientific knowledge to solving problems in the real world.
- The objective is to solve real-world problems. What is the scientific knowledge we need to solve the problem?

Scientific Knowledge:

- Mathematics
- Natural sciences or basic sciences

Application:

- Engineering Sciences
    - e.g. statics
- Engineering Design:
- Practise and experience

Engineering Descriptions:

- The application of scientific and mathematical principles, experience, judgement, and common sense to make products, systems, processes that benefit people, within economic, environmental and resource constraints.

Per ASEE (American Society of Engineering Education)

- Engineering is the art of applying scientific and mathematical principles, experience, judgement, and common sense to make things benefit people.

Per PEO (Professional Engineers Ontario)

The practise of professional engineers is defined in section 1 of the professional engineers act and comprises of three tests. Professional engineering is:

- Any act of planning, designing, composing, evaluating, advising, reporting, directing, or supervising (or the managing of any such act.);
- That requires the application of engineering principles; and
- Concerns the safeguarding off life, health, property, economic interests, the public welfare or the environment.

What is Mechanical Engineering? Cont'd.

- Mechanical engineering is one of the largest and oldest engineering disciplines.

- Mechanical engineers apply the principles of mechanics and energy to the design of machines and devices: *ENERGY* and *MOTION*

What are the Subjects in ME?

- Overall foundation: math, physics, chemistry, analysis skills, communication skills, computation skills.
- Forces, motion, structures: statics, dynamics, kinematics, mechanics of materials and fluids.
- Energy: thermodynamics, heat transfer
- Materials: materials engineering and processing, manufacturing.
- Machines: machine elements, systems design, controls, codes and standards.
- Economics: engineering economic analysis, cost engineering.
- Humanities and Social Studies: social impact, environment impact, government, ethics, law.

Introduction to Engineering Design Process

What is Engineering Design?

- ABET's definition:
  It is a decision making process (often *iterative*) in which the basic sciences, mathematics, and engineering sciences are applied to convert resources optimally to meet a stated objective.

  ABET = Accreditation Board for Engineering and Technology (for the USA)

What is Mechanical Engineering Design?

- Mechanical engineering design is the process of defining and calculating motions, forces and changes in energies in order to determine the sizes shapes ad materials needed for each of the inter-related parts in the machines.

Some terminologies

- Client: a person of a group or a company wants a design conceived.
    - The client could be internal (e.g., the Kinesiology Department who wants testing apparatus designed and built) or external (e.g., a government agency that contracts for a new highway system).
    - The client may or may not be the user or users of the design.

- Design objectives or objectives: features or behaviors that the design is expected to have the Traditional or Conventional Design Process.

- Constraints: limits or restrictions on the features or behaviors of the design. *A design is unacceptable if any constraint is violated.*

- Functions: things that the design is supposed to do.

- Means: a way or method to make a function happen.

- Form: the shape and structure of something as distinguished from its material.

Additional notes about assignments:

Coverage for Assignments

Group of 4

Design logbook

Bound notebook

Fixed number of pages

(No tear-off pages)

To maintain a log (record) of all team activities

Reading assignments:
S1.1
S1.2.1, S1.2.2