Module 5 Sustainable Supply Chains

* Define the term "sustainable supply chain" and explain its relevance to engineering

**Supply Chain**: sequence of activities leading to the delivery of a product, or service, to an "end user"

* Product Design, Manufacturing, By-Products
* Using examples, define and describe Biomimicry

**Biomimicry**: idea that engineers can use in developing products that contribute to a sustainable supply chain

Limestone is formed from ancient sea beds using a low energy, waste-free process for millennia.

Biomimicry prompts us to consider copying the methods nature uses, instead of creating our own processes with the use of high temperature (and pressure).

* Kalundborg as an example, explain the term "Industrial Ecology"

**Industrial Ecology**: factory as an industrial organism, set of factories as an industrial ecosystem

**Kalundborg**: public and private companies buy and sell waste from each other in a closed cycle of industrial production -> economic benefits for participating businesses

* In broad terms, describe the components of material flows analysis

Natural Resources, Energy Efficiency, Bio-Efficiency, Material Efficiency

* Describe the steps in a Life Cycle Assessment

1. Goal and Scope Definition: purpose and objectives; deliverables; boundaries; assumptions.
2. Inventory Analysis: quantifying energy and raw material inputs and environmental releases for each life-stage within the scope of the LCA.
3. Impact Classification: subjectively classify then evaluate the impacts on human health and the environment, including impacts on depletion of resources, and impacts climate change. (note that these activities will change depending on the goal and scope of the LCA)
4. Interpretation: explaining the results in relation to the LCA objectives.

* Explain the term "functional unit"

**Functional Unit**: measure to compare results, relates inputs and outputs

* Given the goal and scope of an LCA example, identify a reasonable functional unit for the LCA and justify your choice