Module 3 Engineering and Complex Systems

* define a system and distinguish between simple and complex systems

**System**: a group of components that are interconnected such that they work together for a common purpose

- unlike the behaviour of simple systems, the behaviour of complex systems is inherently unpredictable

* describe the difference between Cartesian Thinking and Systems Thinking

**Cartesian thinking**: dividing the larger problem into predictable constituent parts then addressing each of the issues associated with each of these parts

**Systems thinking**: perspective that focuses on observing relationships between things and finding recurring patterns within and between these relationships

* apply systems thinking within the engineering context
* read and create concept maps

Focus Question: question that clearly specifies the problem or issue the concept map should help to resolve

* compare and contrast the built environment and the natural environment

1. **Is an industrial organism capable of independent activity?**
2. **Do industrial organisms use energy and material resources and release waste heat and material residues?**
3. **Are industrial organisms capable of reproduction? Not exact copies**
4. **Do industrial organisms respond to external stimuli?**
5. **Does an industrial organism move through stages of growth?**
6. **Does an industrial organism have a finite lifetime?**

* explain the significance of the field of urban ecology to engineering

urban ecology: study of ecology within cities but it is also the study of the ecology ***of*** cities

-> start to consider the dynamic feedbacks between the systems nested within the urban ecology