Genetics of Virus

- **Obligate intracellular parasites** that depend on host cell for:
  - **Enzymes** for metabolic processes such as DNA replication such as DNA polymerases
  - **Machinery** for **protein synthesis** such as **ribosomes**
  - **Building blocks** such as **amino acids** and **nucleotides** due to lack of means of nutrition
  - **ATP** as a form of **energy** due to inability to carry out cellular respiration
- Can only reproduce within a **living host cell**
- Termed as **virions** in **extracellular** states
  - Metabolically inert, does not carry out respiratory/biosynthetic functions
  - Structure by which the virus genome is carried from one cell to another
- Viruses are **infectious particles** which are **active** as **intracellular virus** state, or **inactive** as extracellular **virion** state, as opposed to living or non-living

Are viruses living or non-living?

Living:

- Viruses can reproduce
  - They have genetic material (DNA/RNA)
  - Encoding genes necessary for reproduction
  - In intracellular states within compatible host cells
- Viruses can evolve with their host
  - Viruses acquire genes from host cell
  - Genetic recombination and horizontal gene transfers result in changing viral genomes
- Viruses can react to environmental stimuli (such as radiation, chemicals and heat)

Non-Living:

- Able to exist in a metabolically inert state for extended periods of time
- Lack protoplasm and organelles
- Extracellular state: do not grow, obtain nutrition, respire, reproduce, synthesise proteins or excrete

Basic Structure:

- **Genome** comprising or RNA or DNA
- **Capsid** comprising of protein subunits, capsomeres (protein coat)
- **Envelope** (in envelope viruses) comprising phospholipids from host cell

	Structure
Viral Genome	• Either **DNA** or **RNA**, but not both • Can be **circular**, **linear**, **single-stranded** or **double-stranded** • Contain genes for: ○ **Synthesising** viral capsid and genetic material