Lecture 1

Electric Charge
Chapter 22
Electric Charge (1)

• Electric charge is a fundamental property of atomic particles
  – such as electrons and protons
• Two types of charge: negative and positive
  – Electron is negative, proton is positive
• Usually object has equal amounts of each type of charge so no net charge
• Object is said to be electrically neutral
Electric Charge (2)

• Object has a net charge if two types of charge are not in balance
• Object is said to be charged
• Net charge is always small compared to the total amount of positive and negative charge contained in an object
• The net charge of an isolated system remains constant
Electric Charge (3)

- Charged objects interact by exerting forces on one another

- **Law of Charges:**
  
  Like charges repel, and opposite charges attract

- The standard unit of charge is the Coulomb (C)
Electric Charge (4)

- Electrical properties of materials such as metals, water, plastic, glass and the human body are due to the structure and electrical nature of atoms.
- Atoms consist of protons (+), electrons (-), and neutrons (electrically neutral).
- Electrically neutral atoms contain equal numbers of protons and electrons.
Electric Charge (5)

- Atoms combine to form solids
- Sometimes outermost electrons move about the solid leaving positive ions
- These mobile electrons are called conduction electrons
- Solids where electrons move freely about are called conductors – metal, body, water
- Solids where charge can’t move freely are called insulators – glass, plastic
Electric Charge (6)

- Only the conduction electrons can move
- The positive ions are fixed in place
- Electric charge transfer is a transfer of electrons
  - **Charging positively**: Removal of electrons from an object
  - **Charging negatively**: Addition of electrons to an object