2.1 Basic Notation: System and state

In thermodynamics (and in nearly all other branches of natural science) the part on which the focus of interest lies is called the *system*. The remaining is called the *surrounding*, i.e.
universe = system + surrounding
The astonishing fact about thermodynamics is that all measurements of properties and changes of the system are measured in the surrounding. The separation is important for many practical purposes: e.g. the entropy of a system can decrease, but the entropy of the universe can only increase (2nd Law).
Several kinds of systems exist:

- *Open systems:* Exchange of matter and energy between system and surrounding exist.
- *Closed system:* Exchange of energy between system and surrounding exist.
- *Isolated system:* No exchange with surrounding exists.

Within the system "phases" exist. A phase is a chemically homogeneous body on a macroscopic scale. No discontinuous changes of states are possible within a phase. Within a multi-phase material (composite) properties can change discontinuously at the phase boundary.