

ENGRD 221: ENGINEERING THERMODYNAMICS

Lecture 6: September 11, 2007

Reading Assignments (from Moran & Shapiro, Sixth Edition): Sections 4.1 – 4.5. Read ALL examples in these sections.

Topics covered:

- Open systems (control volumes), conservation of mass
- Examples of open systems
- Steady and unsteady mass flow in a control volume
- Lumped formulation of mass balance for open systems
- The general rate equation for mass balance in a lumped system
- Mass across an area element, convected properties
- Integral form of mass conservation
- Using average velocities to compute mass flow, mass flux
- Conservation of energy
- Energy flux at the control surface, convected energy
- Lumped formulation
- Energy convected with the flow
- Energy flux at the control surface
- Energy balance for the control volume, 1st law of thermodynamics for the control volume
- Flow work, the work term at the boundary, shaft work
- Energy per unit mass for a ‘flowing’ fluid